multiple access techniques, such as code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal frequency division multiple access (OFDMA), OFDM-TDMA, OFDM-FDMA, OFDM-CDMA, or the like. An embodiment of the present disclosure may be applied to resource allocation in as well as asynchronous wireless communication evolving into LTE/LTE-advanced and IMT-2020 beyond GSM, WCDMA, and HSPA, synchronous wireless communication evolving into CDMA, CDMA-2000, and UMB. The present disclosure is not construed to be limited to or limited to a particular wireless communication field and is construed as including all technical fields to which the spirit of the present disclosure may be applied.

[30] UL transmission and DL transmission may be performed based on i) a time division duplex (TDD) technique performing transmission through different time slots or ii) a frequency division duplex (FDD) technique performing transmission through different frequencies.

[31] Further, under the related standard, in some systems such as the LTE system or the LTE-advanced system, the UL and the DL are configured based on a single carrier or a pair of carriers. For transmitting/receiving control information, the UL and the DL may be configured with one or more control channels, such as a physical DL control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid ARQ indicator channel (PITCH), a physical UP control channel (PUCCH), an enhanced physical DL control channel

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(EPDCCH), or the like. For transmitting/receiving data, the UL and the DL may be configured with one or more data channels, such as a physical DL shared channel (PDSCH), a physical UL shared channel (PUSCH), or the like.

[32] Meanwhile, the control information may be transmitted through the EPDCCH (enhanced PDCCH or extended PDCCH).

[33] In the present disclosure, the cell may refer to a coverage of a signal transmitted from a transmission point or a transmission/reception point, a component carrier having the coverage of the signal transmitted from the transmission point or the transmission/reception point, or the transmission/reception point itself.

[34] A wireless communication system to which at least one embodiment is applied may be i) a coordinated multi-point transmission/reception system (CoMP system) in which two or more transmission/reception points cooperate to transmit a signal, ii) a coordinated multi-antenna transmission system, or iii) a coordinated multi-cell communication system. The CoMP system may include at least two multiple transmission/reception points and UEs.

[35] The multiple transmission/reception points may be a base station or macrocell (hereinafter, referred to as 'eNB') and at least one remote radio head (RRH) that is connected to the eNB through an optical cable or an optical fiber and thereby controlled in a wired manner, and that has high transmission power or low transmission power in the macrocell area.

[36] Hereinafter, the DL denotes communication or a communication path from

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multiple transmission/reception points to a UE, or the UL denotes communication or a communication path from the UE to the multiple transmission/reception points. In the DL, a transmitter may be a part of multiple transmission/reception points and a receiver may be a part of the UE. In the UL, a transmitter may be a part of the UE and a receiver may be a part of multiple transmission/reception points.

[37] Hereinafter, transmission/reception of a signal through a channel such as the PUCCH, the PUSCH, the PDCCH, or the PDSCH, may be described as transmission/reception of the channel, such as the PUCCH, the PUSCH, the PDCCH, or the PDSCH.

[38] In addition, hereinafter, a description of transmitting or receiving a PDCCH or a description of transmitting or receiving a signal through the PDCCH may be used as meaning including transmitting or receiving an EPDCCH or transmitting or receiving a signal through the EPDCCH.

[39] That is, a physical DL control channel described below may mean the PDCCH or the EPDCCH, or is also used as meaning including both the PDCCH and the EPDCCH.

[40] Also, for convenience of description and ease of understanding, an EPDCCH may be applied to an embodiment described with the PDCCH, as an embodiment of the present disclosure, and the PDCCH may be also applied to an embodiment described with the EPDCCH as an embodiment.

[41] Meanwhile, higher layer signaling described below includes radio resource

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control (RRC) signaling transmitting RRC information containing an RRC parameter.

[42] The eNB performs DL transmission to UEs. The eNB may transmit a physical DL shared channel (PDSCH) which is a primary physical channel for unicast transmission, and a physical DL control channel (PDCCH) for transmitting i) DL control information such as scheduling required to receive the PDSCH and ii) scheduling approval information for transmission through an UL data channel (for example, a physical UL shared channel (PUSCH)). Hereinafter, transmitting/receiving a signal through each channel may be described in such a manner that a corresponding channel is transmitted/received.

[43] Any of multiple access techniques may be applied to the wireless communication system, and therefore no limitation is imposed on them. For example, the wireless communication system may employ various multiple access techniques, such as time division multiple access (TDMA), frequency division multiple access (FDMA), CDMA, orthogonal frequency division multiple access (OFDMA), non-orthogonal multiple access (NOMA), OFDM-TDMA, OFDM-FDMA, OFDM-CDMA, or the like. The NOMA includes sparse code multiple access (SCMA), low cost spreading (LDS), and the like.

[44] Embodiments of the present disclosure may be applied to resource allocation in i) asynchronous wireless communication evolving into LTE/LTE-advanced and IMT-2020 from GSM, WCDMA, and HSPA, ii) synchronous wireless communication evolving into CDMA, CDMA-2000, and UMB. In the present disclosure, a machine type communication (MTC)

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terminal may refer to a terminal supporting low costs (or low complexity), a terminal supporting coverage enhancement, or the like. As another example, the MTC terminal may refer to a terminal defined as a predetermined category for supporting low cost (or low complexity) and/or coverage enhancement. In other words, the MTC terminal may refer to a low cost (or low complexity) user equipment category/type newly defined in 3GPP Release-13 and performing LTE-based MTC-related operations. The MTC terminal may refer to a user equipment category/type defined in or before 3GPP Release-12, which supports enhanced coverage in comparison with the typical LTE coverage or supports low power consumption. Or, the MTC device may refer to a low cost (or low complexity) user equipment category/type newly defined in Release-13. The MTC terminal may refer to a further enhanced MTC terminal defined in Release-14.

[45] In the present disclosure, a Narrowband Internet of Things (NB-IoT) terminal refers to a terminal supporting radio access for cellular IoT. NB-IoT technology improves indoor coverage, supports for large-scale low-speed terminals, lowers latency sensitivity, reduces terminal costs, minimizes power consumption, and optimizes network architecture.

[46] An enhanced mobile broadband (eMBB), massive machine-type communication (mMTC), and ultra-reliable and low latency communication (URLLC) are proposed as representative usage scenarios for NR having been discussed in the 3GPP recently. In the present disclosure, a frequency, a frame, a subframe, a resource, a resource block (RB), a region,

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a band, a sub-band, a control channel, a data channel, a synchronization signal, various reference signals, various signals, and various messages, associated with NR may be interpreted as meanings that were used in the past or are used in the present or as various meanings that will be used in the future.

[47] Embodiments described below may be applied to UEs, base stations, and core network entities (e.g., MME, AMF, etc.), using next generation mobile communication (5G mobile communication, New-RAT, NR). For convenience of description, the base station may denote a base station (a central unit (CU), a distributed unit (DU), or an entity in which the CU and the DU are implemented as one logical entity) or a gNB, in a 5G radio network in which the central unit and the distributed unit are separated from each other.

[48] In addition, the central unit and the distributed unit described herein may mean a central unit and a distributed unit included in one base station, respectively, and one or more distributed units may be connected to one central unit. Thus, the distributed unit described below may mean a specific distributed unit of a set of one or more distributed units. In addition, a service described herein may mean the overall of a network service configured by utilizing resources of a network in which a user equipment is connected to the network through a base station. Such a service may be provided through an end-to-end network slice described below.

[49] Typical mobile communication networks, such as 4G mobile communication network (e.g., LTE), include a core network and an access network linked through physical

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network entities. As a result, the efficiency of utilizing network resources reduces, and it is not easy to change configurations of the communication network. Recently, discussions have been conducted on a service-oriented next generation mobile communication network employing a network slicing technology for effectively accommodating a mobile service with various requirements, and guaranteeing quality of an end-to-end service to even UEs.

[50] The network slicing is a technology for improving flexibility by dividing a network into multiple types of virtual networks using network virtualization technologies and configuring a separate logical network for each service or subscriber. With network slicing, a needed resource may be allocated from a virtualized network resource pool according to a service type. Therefore, when a new service is introduced, it is possible to provide the service rapidly without a physical network established, and to use efficiently limited physical network resources. Thus, the network slicing enables a logical network to be implemented in an infrastructure shared among multiple network slices, compared with establishing an independent network slicing infrastructure.

[51] FIG. 1 is a diagram illustrating a plurality of slices configured in a network infrastructure.

[52] Referring to FIG. 1, a service for connecting a notebook to the Internet through mobile broadband (MBB), a data service of watt-hour meter using machine type communications (MTC), a service for a video camera mounted on a police helmet and a notebook located on a

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police car, a data service of an MTC sensor, and the like, may be individually and dependently provided through a plurality of slices configured in a network infrastructure. Thus, network resource utilization, etc. may be improved by slicing and providing the network resource for each individual service.

[53] The network slicing allows differentiated treatment depending on each customer requirements. With slicing, it is now possible for mobile network operators (MNO) to consider customers as belonging to different tenant types with each having different service requirements that govern in terms of what slice types each tenant is eligible to use based on service level agreement (SLA) and subscriptions.

[54] A specific procedure is needed for a UE to transmit and receive data through a specific network slice or one or more network slices provided over a shared infrastructure. However, such a specific procedure has not been proposed or developed yet. In particular, the mobility of the UE is essentially required in mobile communication. It is necessary to develop a specific method for transmitting and receiving data without service interruption through the specific network slice or one or more network slices. However, such a specific method has not been provided yet. Accordingly, it is impossible to guarantee the service continuity when a cell change is required as the UE moves.

[55] To address such issues, in accordance with embodiments of the present disclosure, a method and apparatus are provided for transmitting and receiving data based on

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network slicing in a mobile communication network. In addition, a method and apparatus are provided for minimizing service interruption while a UE moves between cells, and transmitting and receiving data based on network slicing.

[56] Hereinafter, specific methods according to embodiments of the present disclosure are discussed in detail. Methods described below may be used individually or in any combination with methods.

[57] A cell in the LTE is defined as "combination of DL and optionally UL resources" Synchronization of the cell in the LTE depends on PSS/SSS and allows the UE to acquire the encoded PCI and the frame timing for reception of all DL transmissions and for all UL transmissions (in addition to the UL timing advance, for UL transmissions). In this sense, all DL transmissions which are time aligned with PSS/SSS and all UL transmissions using the PSS/SSS as timing reference belong to a cell. In order to suppress interference from neighbor cells, all DL transmissions are scrambled with (for physical channels) or determined by (for reference signals) a specific sequence. For most DL transmissions, the corresponding sequence is associated to the PCI, which value is determined from the sequence visible from PSS/SSS. Using different PCI values for neighbor cells allows different DL transmissions to use different sequences. After synchronization to the network, the UE acquires the cell reference symbols (CRS) which allows decoding the PBCH carrying the MIB. According to the MIB, the UE knows the cell bandwidth, PHICH and SFN. After acquiring the MIB and the PCFICH, the UE

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knows exactly the location of control channel, i.e., PDCCH and can acquire system information. From L3 perspective, system information is a set of parameters associated to each other as part of "a cell". All these signals and channels are using a sequence determined by the value of the PCI, which is the same for all, Data transmission in LTE is controlled by information transmitted on PDCCH. The UE is allocated at least a C-RNTI, which is implicitly encoded in control indications (either DL, DCI, or UL, UCI) via a CRC calculation. As for data, they are scrambled using a sequence determined by the PCI but also by the UE RNTI also providing some randomization of transmissions across multiple UEs, which can be useful e.g. in case of spatial multiplexing. When the UE is in RRC_CONNECTED, the UE is configured with DL measurement gap and measurement events in order to prepare handover as the UE is moving. The measurement process includes synchronization and reading of CRS and PCI is used to identify different cells.

[58] It is also necessary define a cell in a new radio technology network (or a 5G network, hereinafter, for convenience of description, referred to as NR). For example, one NR cell in the NR may be associated with one or more of procedures described below.

[59] - DL synchronization signals deriving identical NR cell ID;

[60] - identical system information distribution for at least minimum SI;

[61] - efficient use of all possible types of multi-TRP operation;

[62] - DL/UL physical channels/signals towards a connected UE are identical/valid in

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more than one TRP.

[63] An NR cell may have one or more of a single set of system information, barring and same tracking area. In the case that a single NR cell consists of more than one TRP, then all the TRPs transmit the same system information.

[64] The NR cell may be flexibly associated with slice information. For example, an NR cell may support a dedicated slice information or multiple different slice information. One NR cell may support slice information different from those of neighbor NR cells. Here, the slice information may represent a slice type, a tenant type, a slice identity (ID), a tenant ID, multi-dimensional descriptor (MDD) information, a slice service, slice service information, slice configuration information, slice characteristic information, an RAN function (any NR functions, any E-UTRAN functions) of a corresponding slice, or information for differentiating/identifying/describing an RAN function list of a corresponding slice. For convenience of description, hereinafter, the term "slice information" will be used. This is only for convenience of description, and thus, it should be considered that any information for differentiating/identifying/describing a specific network slice in the NR is included the scope of the present disclosure. For example, information for identifying a network slice may be described as slice information.

[65] The slice information for identifying a network slice may include information on a slice service type and a slice differentiator. The slice differentiator includes information

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representing a difference between identical slice service types. For example, the eMBB service may be designated as one slice service type. As another example, the URLLC may be designated as one slice service type. As further another example, the IoT service may be designated as one slice service type. As yet another example, a slice differentiator may be designated for supporting a voice service in the eMBB slice service type. As yet another example, a slice differentiator may be designated for supporting an image service in the eMBB slice service type.

[66] For enabling a UE (hereinafter, for convenience of description, referred to as a UE configured with a specific slice) having one specific slice information or one or more specific slice information (or associated with this or configured with this) to access NR cell/network (hereinafter, for convenience of description, referred to as a cell/network configured with a slice) having corresponding slice information, the network configured with the related slices may provide additional information.

[67] For example, an NR cell may provide slice information to a UE. For example, the slice information may be broadcast through system information. As another example, the slice information may be indicated to a UE through RRC dedicated signaling. Through this information, the UE may select an NR cell providing i) a slice configured for the UE, ii) a slice to which the UE belongs, and iii) a slice to which the UE has subscribed.

[68] For another example, an NR cell may provide slice information of a neighbor

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cell to a UE. For example, the slice information of the neighbor cell may be broadcast through system information. As another example, the slice information of the neighbor cell may be indicated to a UE through RRC dedicated signaling. Through this information, the UE may select or reselect an NR cell providing i) a slice configured for the UE, ii) a slice to which the UE belongs, and iii) a slice to which the UE has subscribed.

[69] Meanwhile, when the UE configured with a specific slice moves between cells (or moves between base stations, moves to another base station cell), technologies for supporting the service continuity may be provided for reducing service interruption. Examples of possible service scenarios are as follows.

[70] Scenario 1: Moving from a cell supporting network slicing to a cell not supporting the network slicing

[71] While a UE is located in a source cell (or a current cell or a camped cell), the UE may recognize whether a neighbor cell to which the UE is intended to move supports/allows a specific network slice based on on-demand system information associated with network slicing related system information or network slicing related minimum system information of a neighbor cell, or indication information over RRC dedicated signaling (e.g., an RRC release message) for identifying whether the neighbor cell supports the network slicing.

[72] When the neighbor cell does not support/allow the specific network slice, while the UE transmits and receives data through network slicing in the source cell, the UE may

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request a network slicing service to an application server for supporting the specific network slice through unicast, reselect a cell supporting/ allowing the specific network slice, or reselect a cell by generating a cell reselection priority of the cell not supporting/allowing the specific network slice to be a lower priority. To this end, the NR cell may generate the cell reselection priority differently according to whether the neighbor cell supports/allows the specific network slice, and then indicate this to the UE. The UE may perform cell reselection by assigning a priority to a cell supporting/allowing the specific network slice configured for the UE. When one or more network slices are configured for the UE, the UE may perform the cell reselection based on a cell reselection priority of a network slice (e.g., selecting a network slice having a higher priority) according to network slice priority information configured/allowed/indicated by a core network entity.

[73] Scenario 2: A movement from a cell not supporting/allowing network slicing to a cell supporting/allowing the network slicing

[74] While a UE is located in a source cell (or a current cell or a camped cell), the UE may recognize whether a neighbor cell to which the UE is intended to move supports/allows a specific network slice based on on-demand system information associated with network slicing related system information or network slicing related minimum system information of a neighbor cell, or indication information over RRC dedicated signaling (e.g., an RRC release message) for identifying whether the neighbor cell supports the network slicing. To this end, the NR cell

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may generate a cell reselection priority differently depending on whether the neighbor cell supports/allows the specific network slice or not, and then inform the UE of the cell reselection priority. Through this, the UE may perform cell reselection based on the cell reselection priority assigned to a cell supporting/allowing the specific network slice.

[75] Hereinafter, a UE and a base station for configuring a network slice and controlling mobility will be described with reference to the accompanying drawings.

[76] FIG. 2 illustrates a flowchart illustrating operations of a base station according to at least one embodiment of the present disclosure.

[77] Referring to FIG. 2, the base station may receive network slice request information from a UE configured with a network slice, at step S210. For example, the UE may be configured with one or more network slices through network slice information received through broadcast system information or an RRC reconfiguration message. Alternatively, the UE may be configured with one or more network slices using pre-configured network slice information. One network slice may be configured to be associated with one protocol data unit (PDU) session.

[78] The base station has receives the network slice request information from the UE. The network slice request information may be included in a radio resource control (RRC) connection setup message. Alternatively, the network slice request information may be included in a non-access stratum (NAS) message included in the RRC connection setup message.

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[79] In addition, the network slice request information may include specific network slice information configured for the UE. For example, the network slice request information may include information on at least one of network slice configured for the UE, information for identifying a network slice service/PDU session/bearer associated with the corresponding network slice information, and information on a priority of the corresponding network slice. Here, the network slice information associated with the UE means information on a network slice configured for the UE by a network or information on a network slice allowed by the network based on subscription information.

[80] The base station may control the network slice request information to be transferred to a core network entity, at step S220. For example, when the base station receives the network slice request information from the UE, the base station may control the received network slice request information to be transferred to the core network entity. This is for authorization, identification and confirmation/acknowledgment by the UE on network slice information included in the corresponding network slice request information. To this end, the base station transmits the network slice request information to the core network entity.

[81] The base station may receive specific network slice information that is configured based on the network slice request information from the core network entity, at step S230. After the base station has transmitted the network slice request information to the core network entity, the base station may receive the specific network slice information that is

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configured based on the network slice request information from the core network entity. For example, the specific network slice information is identified by the core network entity based on the network slice request information and the subscription information and may be received by being included in UE context information.

[82] When the core network entity has received the network slice request information, the core network entity may verify whether the UE has a right to access the corresponding network slice. As another example, the core network entity may transmit, to the base station, UE context information including specific configured network slice information according to a value that is included in subscriber information etc. though a subscriber information server. For example, the UE context information transmitted by the core network entity may include network slice related information or configured network slice information. Here, the network slice related information may include at least of information for identifying a service/PDU session/bearer associated with corresponding network slice information and bearer information of a PDU session associated with the network slice.

[83] Through this, the core network entity may control a service through the network slice of the UE, and data transmission and reception through the network slice.

[84] FIG. 3 illustrates a flowchart illustrating operations of a base station according to at least one embodiment of the present disclosure.

[85] Referring to FIG. 3, the base station may receive network slice request

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information from a UE configured with a network slice at step S210, control the network slice request information to be transferred to be a core network entity at step S220, receive specific network slice information that is configured based on the network slice request information from the core network entity at step S230, and transmit the specific network slice information to a target base station at step S340.

[86] Here, the steps S210 to S230 may be performed in identical or similar manner to embodiments described above with reference to FIG. 2.

[87] After the base station has received the specific network slice information from the core network entity, the base station may transmit the specific network slice information to the target base station. For example, the base station may transmit the specific network slice information to the target base station through the core network entity. As another example, the base station may transmit the specific network slice information to the target base station through an interface with the target base station.

[88] When the target base station receives the specific network slice information, the target base station may generate a handover command for the UE based on at least one of the specific network slice information and network slice information allowed by the target base station. The handover command that the target base station has transferred to the base station may be transmitted to the UE by the base station. That is, the UE receives the handover command from the source base station.

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[89] FIG. 4 illustrates a flowchart illustrating operations of a user equipment according to at least one embodiment of the present disclosure.

[90] Referring to FIG. 4, the UE may configure the network slice at step S410. For example, the UE may be configured with one or more network slices through network slice information received through broadcast system information or an RRC reconfiguration message. Alternatively, the UE may be configured with one or more network slices using pre-configured network slice information. One network slice may be configured to be associated with one protocol data unit (PDU) session. Accordingly, the UE may be configured with one or more network slices.

[91] The UE may transmit the network slice request information to the base station at step S420. The network slice request information may be included in a radio resource control (RRC) connection setup message. Alternatively, the network slice request information may be included in a non-access stratum (NAS) message included in the RRC connection setup message. That is, the UE may transmit the network slice request information through high layer signaling.

[92] The network slice request information may include the specific network slice information configured for the UE. Furthermore, the network slice request information may include information on at least one of network slices configured for the UE, information for identifying a network slice service/PDU session/bearer associated with the corresponding network slice information, and information on a priority of the corresponding network slice.

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Here, the network slice information configured for the UE means information on network slices configured for the UE by a network or information on network slices allowed by the network based on subscription information.

[93] The UE may receive, from the base station, the handover command at step S430. The handover command is generated by the target base station based on the specific network slice information received from the core network entity. As described above, the core network entity may identify information on the specific network slice based on the network slice request information and the subscription information.

[94] For example, in the case of the handover of the UE, the core network entity may transmit the identified specific network slice information to the target base station. When the target base station receives the specific network slice information, the target base station may generate a handover command for the UE based on at least one of the specific network slice information and network slice information allowed by the target base station. The target base station may transfer the generated handover command to the base station, and the base station may transmit the handover command to the UE.

[95] Through these processes, the UE may perform the handover while maintaining the continuity of a service through the network slice.

[96] As described above, it is possible for the UE, the base station and the core network entity to establish a service through a network slice, maintain the continuity of a

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network slice service and provide the mobility of the UE.

[97] Hereinafter, embodiments for maintaining the mobility of an RRC connected UE are discussed in detail. Each embodiment described below may be performed independently or in combination with one or more other embodiments. Further, each embodiment may include different one or more embodiments from descriptions or embodiments described referring to FIGS. 2 to 4. In addition, the base station and the UE discussed in descriptions and embodiments described with reference to FIGS. 2 to 4 may be performed in each of embodiments described below as well.

[98] A first embodiment: Transferring UE indication information including network slice information

[99] In the case of a UE in an RRC connected state, it may be effective from a network perspective that a handover is to be performed to a cell supporting a network slice (or a cell supporting/allowing a specific network slice configured for the corresponding UE).

[100] In addition, in the case of a UE in an RRC idle state or a UE in an RRC inactive state, for RRC connection establishment of the UE, recognizing by a base station that a specific network slice is configured for the UE may be helpful for the UE to select a cell/network for consecutively providing a service based on the corresponding network slice as the UE moves.

[101] For example, i) when a serving cell (or a current cell or a Pcell, hereinafter, referred to as "serving cell") provides network slice information through system information, and

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a UE receives the network slice information through the system information in the serving cell, ii) when a specific network slice is configured for the UE in advance, or iii) when a specific network slice is configured for the UE through a network, the UE may indicate request information (network slice request information) on this to a base station.

[102] The network slice request information represents single slice information configured for the UE or a collection of single slice information configured for the UE. This represents information on a network slice allowed by a network based on the slice information configured for the UE by the network or subscription information. Hereinafter, the request information on the network slice may be used the meaning as this. For another example, a UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE for performing data communication based on a specific network slice through network slicing, in the RRC idle state may initiate a procedure of indicating configured slice request information to a base station in the case of at least one of when RRC connection establishment is performed, when entering or leaving a cell/network supporting/allowing a current network slice, when initiating or terminating a PDU session, when network slicing related system information is changed, when a configured network slice for receiving through network slicing is changed, when a configured network slice service for receiving through network slicing is changed. For example, a UE has received network slice information configured when a PDU session is established through a

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previous network attachment procedure. Upon the receipt, the UE may initiate a procedure of indicating corresponding network slice request information to a base station when a RRC connection is established.

[103] For further another example, when a UE is configured with a network slice, when a UE is configured with data transmission and reception through a specific network slice, when a UE is able to support network slicing, or when a UE performs data communication based on a specific network slice through network slicing, in the RRC inactive state, the UE may initiate a procedure of indicating network slice request information to a base station. That is, the UE may initiation the procedure in the case of at least one of i) when RRC connection establishment is performed, ii) when entering or leaving a cell/network supporting/allowing a current network slice, iii) when initiating or terminating a PDU session, when network slicing related system information is changed, iv) when a configured network slice for receiving through network slicing is changed, v) when a configured network slice service for receiving through network slicing is changed. Here, the RRC inactive state represents a new state based on a core network connection in the NR. The new state may satisfy the following characteristics.

[104] While the UE is in the new state, the attributes of UE, RAN and CN are characterized as follows:

[105] - The connection between CN and RAN is maintained in terms of both control and user planes.

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[106] - The UE is reachable by a RAN initiated notification procedure for which the relevant parameters are configured by RAN itself.

[107] - RAN is tracking the UE location on the level of a "RAN-based notification area" and is aware whenever the UE moves from one "RAN-based notification area" to another.

[108] As yet another example, a UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE for performing data communication based on a specific network slice through network slicing, in the RRC connected state may initiate a procedure of indicating network slice request information to a base station in the case of at least one of i) when RRC connection establishment is performed, ii) when entering or leaving a cell/network supporting/allowing a current network slice, iii) when initiating or terminating a PDU session, when network slicing related system information is changed, iv) when a configured network slice for receiving through network slicing is changed, v) when a configured network slice service for receiving through network slicing is changed, or vi) when an RRC connection reconfiguration confirmation message is transmitted to a target base station after having received an RRC connection reconfiguration message including mobility control information.

[109] The network slicing may be operated independently between cells/base stations using an identical frequency. A network slicing area may be configured regardless of a frequency.

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[110] The UE may include one or more slice information configured for the UE in the network slice request information. Alternatively, the UE may include, in the network slice request information, at least one of corresponding network slice information received through system information, configured for the UE in advance, or received through an RRC connection reconfiguration message, information for identifying a service/PDU session/bearer associated with the corresponding network slice information, and priority information on a corresponding network slice.

[111] The network slice request information may be transmitted through a new field included in an RRC message of at least one of a UE assistance message, an RRC connection establishment request message, an RRC connection setup complete message, or transmitted through a new RRC message newly defined. Alternatively, the network slice request information may be transmitted to a base station through an RRC connection setup complete message by being included a NAS message.

[112] The base station may control data transmission and reception through network slicing based on the network slice request information received from UEs. For example, the base station may initiate or terminate this. As another example, the base station may indicate network slice information to a UE. As further another example, the base station may indicate a bearer associated with network slicing to a UE.

[113] A second embodiment: Transferring network slice request information to a

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base station through a core network entity

[114] In the case of a UE in the RRC connected state, it may be effective from a network perspective to handover the UE in the RRC connected state to a cell supporting a network slice (or a cell supporting/allowing a specific network slice configured for the corresponding UE).

[115] In addition, in the case of a UE in an RRC idle state or a UE in an RRC inactive state, a base station needs to be aware of that a specific network slice is configured for the UE in order to enable the UE to receive consecutively a service based on the corresponding network slice as the UE moves.

[116] For example, i) when a serving cell (or a current cell or a Pcell, hereinafter, referred to as "serving cell") provides network slice information through system information, and a UE receives the network slice information through the system information in the serving cell, ii) when a specific network slice is configured for the UE in advance, and/or iii) when a specific network slice is configured for the UE through a network, the UE may indicate network slice request information on this to a base station through a core network entity (e.g., an access and mobility management function (AMF) which is a 5G core network entity).

[117] As another example, a UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE that for performing data communication based on a specific network slice

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through network slicing, in the RRC idle state may transmit network slice request information to a core network entity in the case of at least one of i) when RRC connection establishment is performed, ii) when entering or leaving a cell/network supporting/allowing a current network slice, iii) when initiating or terminating a PDU session, iv) when network slicing related system information is changed, v) when a configured network slice for receiving through network slicing is changed, vi) when a configured network slice service for receiving through network slicing is changed, vii) when a network attachment is performed, viii) when a tracking area is updated, ix) when a service request is performed, x) when network connection registration is performed, or xi) when PDU session establishment is performed.

[118] As further another example, a UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE that for performing data communication based on a specific network slice through network slicing, in the RRC inactive state may transmit network slice request information to a core network entity in the case of at least one of i) when RRC connection establishment is performed, when entering or leaving a cell/network supporting/allowing a current network slice, when initiating or terminating a PDU session, when network slicing related system information is changed, when a configured network slice for receiving through network slicing is changed, when a configured network slice service for receiving through network slicing is changed, when a network attachment is performed, when a tracking area is

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updated, when a service request is performed, when network connection registration is performed, or when PDU session establishment is performed.

[119] As yet another example, a UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE that for performing data communication based on a specific network slice through network slicing, in the RRC connected state may transmit network slice request information to a core network entity in the case of at least one of i) when RRC connection establishment is performed, ii) when entering or leaving a cell/network supporting/allowing a current network slice, iii) when initiating or terminating a PDU session, iv) when network slicing related system information is changed, v) when a configured network slice for receiving through network slicing is changed, vi) when a configured network slice service for receiving through network slicing is changed, vii) when a network attachment is performed, viii) when a tracking area is updated, ix) when a service request is performed, x) when network connection registration is performed, or xi) when PDU session establishment is performed.

[120] The core network entity (e.g., an AMF which is a 5G core network entity) may transmit specific network slice information to a base station through a procedure for setting up a UE context.

[121] The network slicing may be operated independently between cells/base stations using an identical frequency. A network slicing area may be configured regardless of a

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frequency. For example, a specific network slice may be configured in at least one cell/base station/area of a network and not provided in another cell/base station/area. When a UE performs at least one of network attachment, a tracking area update, a service request, network connection registration or PDU session establishment, the corresponding network slice area may be one of an attachment area, a tracking area, or a set of cells, allocated by a core network entity (e.g., an AMF which is a 5G core network entity). Alternatively, when a UE performs at least one of network attachment, a tracking area update, a service request, network connection registration or PDU session establishment, the corresponding network slice area may be one of an RAN notification area, or a set of cells, allocated by a base station.

[122] The UE may include information on a specific slice configured for the UE in the network slice request information transmitted to the core network entity. Alternatively, the UE may include, in the network slice request information, at least one of corresponding network slice information received through system information, configured for the UE in advance, or received through an RRC connection reconfiguration message, information for identifying a network slice service/PDU session/bearer associated with the corresponding network slice information, and priority information on a corresponding network slice. The slice information configured in advance which is included in the network slice request information represents slice information allowed by the network based on slice information configured for the UE by a network or subscription information.

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[123] The base station may control data transmission and reception through network slicing based on the network slice request information received from the UE through the core network entity. The core network entity may verify whether the UE has a right to access the corresponding network slice. Accordingly, the base station may control data transmission and reception through network slicing based on the network slice request information received from the core network entity. For example, the base station may initiate or terminate this. As another example, the base station may indicate network slice information to the UE. As further another example, the base station may indicate a bearer of a PDE session associated with the network slice to the UE. As yet another example, the base station may process data based on the network slice. As yet another example, the base station may process may perform distinguished data processing for the corresponding network slice by selecting a RAN portion of the corresponding network slice.

[124] A third embodiment: Transferring slice information to a target base station during a handover

[125]

[126] While a UE in the RRC connected state transmits and receive data through a specific network slice, a handover may be performed as the UE moves. As described above, recognizing that a neighboring cell supports the corresponding slice may be helpful for a 5G cell/base station/network to allow the UE to be handed over.

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[127] As described in the first and second embodiments, a base station recognizes network slice information configured for the UE in the RRC connected state or allowed in a network, by help information (e.g., network slice request information) provided by the UE or a 5G core network entity.

[128] While preparing the handover, the source base station may transfer the network slice request information received from the UE to a target base station, if available. As another example, while preparing the handover, the source base station may transfer the network slice request information received from the core network entity to a target base station, if available. As further another example, while preparing the handover, the source base station may transfer the network slice request information received from the UE or the core network entity to a target base station through the core network entity, if available. Here, transferred network slice request information may mean specific network slice information that the core network entity has identified based on subscription information.

[129] As another example, before updating network slice information after the handover has been performed, the UE may read network slice related system information (or on-demand system information associated with network slice related minimum system information or control information for identifying whether network slicing is supported/allowed/configured/performed).

[130] As further another example, when network slice related minimum system

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information or control information for identifying whether network slicing is supported/allowed/configured/performed is not provided from a source cell, or when a UE that has not performed reception through network slicing performs a handover, the UE after the handover has been performed may indicate the configured network slice information to the base station.

[131] For example, the network slice request information may be transmitted with being included in a handover request message. As another example, the configured network slice information may be transmitted by being included in a handover preparation message. As further another example, the configured network slice information may be transmitted by being included in AS-context information of the handover preparation message. As yet another example, a target cell/base station may include the network slice information in a handover response inter-base station interface (Xn) message or a handover command inter-node RRC message. For example, network slice information that is supported/allowed by a target cell/base station may be included in the handover response inter-base station interface (Xn) message or the handover command inter-node RRC message.

[132] As another example, when a target cell/base station does not support/allow a corresponding network slice, the target base station may include information for indicating this in a handover response inter-base station interface (Xn) message or a handover command Inter-node RRC message. For example, failed network slice information that is not

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supported/allowed by the target cell/base station may be included in the handover response inter-base station interface (Xn) message or the handover command inter-node RRC message.

[133] For example, when a target cell/base station has received the configured network slice information through a source cell/base station, and when the target cell/base station does not support/allow network slicing or does not provide the corresponding configured network slice through the network slicing, or the source cell and the target cell are included in different network slice areas from each other, the target base station may transfer, to the source base station, the handover response inter-base station interface (Xn) message including information for indicating not supporting/allowing the network slice received through the source base station. As another example, when the target cell/base station has received the information through the source cell/base station, and when the target cell/base station does not support/allow network slicing or does not provide the corresponding configured network slice through the network slicing, the target base station may transfer a handover command inter-node RRC message including information for indicating this to a corresponding UE. As another example, the source base station may not determine the handover to the target base station.

[134] As further another example, while preparing the handover, the source base station may transfer network slice information received from the UE or the core network entity to a target base station through the core network entity, if available. In the typical technology, a handover based on an interface between a core network entity and a base station is used only

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when a handover based on an inter-base station interface cannot be used. For example, in the typical LTE technology, a handover based on an interface (S1) between a core network entity and a base station is used only when a handover based on an inter-base station interface (X2) cannot be used. Similarly, in the 5G network, a handover based on an interface between a core network entity and a base station may be used only when a handover based on an inter-base station interface cannot be used. For example, the handover based on an interface between a core network entity and a base station may be used when a direct interface is not present between the source base station and the target base station, or the source base station and the target base station are included in different network areas from each other. Thus, when a direct interface is not present between the source base station and the target base station, or the source base station and the target base station are included in different network areas from each other, the source base station may transfer network slice information received from a UE or a core network entity to the target base station through the core network entity.

[135] A fourth embodiment: Transferring network slice information to a target base station through an RRC connection reconfiguration confirmation message

[136] For example, a UE may receive an RRC connection reconfiguration message including mobility control information through a source base station. As another example, a UE may receive an RRC connection reconfiguration message including mobility control information generated from a target base station through a source base station. The UE may

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include the network slice information (network slice related information or configured network slice information) in an RRC connection reconfiguration confirmation message. The network slice related information may include at least of information for identifying a service/PDU session/bearer associated with corresponding network slice information and bearer information of a PDU session associated with the network slice. Upon receipt of the network slice related information, the UE may initiate a procedure of identifying the network slice information to a core network entity. To this end, the UE may transmit a NAS message including the network slice information to the base station.

[137] The base station may control data transmission and reception through network slicing based on the information received from UEs. For example, the base station may initiate or terminate this. As another example, the base station may indicate the network slice information to the UE. As further another example, the base station may indicate a bearer associated with network slicing to the UE. As yet another example, the base station may process data based on the network slice.

[138] A fifth embodiment: Receiving slice information through an interface between a core network and a base station from a core network entity in the process of a handover.

[139] A base station may receive slice information through an interface between the core network and the base station from the core network entity in the process of an inter-base station handover of a UE in the RRC connected state. For example, when the core network

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entity receives a path change request message (e.g., a path switch request message) including specific network slice information from a target base station, the core network entity may transmit a path change request confirmation message including the specific network slice information. The base station may control data transmission and reception through a corresponding network slice based on the information received from the core network entity. For example, the base station may initiate or terminate this. As another example, the base station may indicate the network slice information to the UE. As further another example, the base station may indicate a service/PDU session/bearer associated with the network slice to the UE. As yet another example, the base station may process data based on the network slice.

[140] As another example, the core network entity may transmit specific network slice information to the base station for setting up/configuring a UE context for a network slice in a handover process of the RRC connected UE. A UE configured with a network slice, a UE configured with data transmission and reception through a specific network slice, a UE available to network slicing, or a UE that for performing data communication based on a specific network slice through network slicing may transmit network slice request information to the core network entity in the case of at least one of i) when RRC connection establishment is performed, ii) when entering or leaving a cell/network supporting/allowing a current network slice, iii) when initiating or terminating a PDU session, iv) when network slicing related system information is changed, v) when a configured network slice for receiving through network slicing is changed, vi)

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when a configured network slice service for receiving through network slicing is changed, vii) when a network attachment is performed, viii) when a tracking area is updated, ix) when a service request is performed, x) when network connection registration is performed, or xi) when PDU session establishment is performed. As another example, a base station that has received network slice information from a UE or a core network entity, a base station that has indicated network slice information to a UE, a base station that has indicated a service/PDU session/bearer associated with a network slice to a UE, or a base station that processes data based on a corresponding network slice may transmit network slice request information to the core network entity in the case of at least one of i) when entering or leaving a cell/network supporting/allowing a current network slice, ii) when initiating or terminating a PDU session, iii) when network slicing related system information is changed, iv) when a configured network slice for receiving through network slicing is changed, v) when a configured network slice service for receiving through network slicing is changed, vi) when a network attachment is performed, vii) when a tracking area is updated, viii) when a service request is performed, ix) when network connection registration is performed, or x) when PDU session establishment is performed. The network slice request information may include network slice related information or configured network slice information. The network slice related information may be at least one of information for identifying a service/PDU session/bearer associated with corresponding network slice information and bearer information of a PDU session associated with the network slice.

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[141] The core network entity may transmit specific network slice information to the base station for setting up a UE context for a corresponding network slice. To this end, the core network entity may indicate, to the base station, UE context information including specific configured network slice information according to a value that is included in subscriber information etc. though a subscriber information server etc. The UE context information transmitted by the core network entity may include network slice related information or configured network slice information. The network slice related information may be at least one of information for identifying a service/PDU session/bearer associated with the corresponding network slice information and bearer information of a PDU session associated with the network slice.

[142] For other example, while preparing the handover, the source base station may transfer specific network slice information received from the UE or the core network entity to a target base station through the core network entity, if available. The core network entity that has received the specific network slice information received from the source base station may transmit the specific network slice information to the target base station for setting up a UE context for a corresponding network slice.

[143] A sixth embodiment: A method of a UE for transmitting network slice information to a base station after a handover has been completed

[144] For example, in a handover process of a UE in an RRC connected state, a

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source base station may transfer network slice information received from the UE or a core network entity to a target base station through the core network entity, if available. When the UE receives a handover command generated from the target base station through the source base station, the UE performs the handover. The handover command may include the network slice information (network slice related information or configured network slice information). The network slice related information may include at least one of information for identifying a service/PDU session/bearer associated with the corresponding network slice information and bearer information of a PDU session associated with the network slice. Upon the receipt of the network slice related information, the UE may initiate a procedure for identifying the network slice information to the core network entity. The procedure of identifying the network slice information to the core network entity may be at least one of a network attachment, a tracking area update, a service request, network connection registration or PDU session establishment.

[145] Through operations described above, a UE may be able to consecutively use a service through a network slice even when the UE moves.

[146] Hereinafter, a base station and a UE for performing a part or all of each embodiment described above will be discussed with reference to the drawings.

[147] FIG. 5 is a block diagram illustrating a base station according to at least one embodiment of the present disclosure.

[148] Referring to FIG. 5, the base station 500 may include a receiver 530 receiving

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network slice request information from a UE configured with a network slice and a controller 510 controlling the network slice request information to be transferred to a core network entity.

[149]

[150] In addition, the receiver 530 may receive specific network slice request information configured based on the network slice request information from the core network entity. The receiver 530 may receive the network slice request information through an radio resource control (RRC) connection setup message.

[151] The network slice request information may include the specific network slice information configured for the UE. Furthermore, the network slice request information may include at least one of network slice information configured for the UE, information for identifying a network slice service/PDU session/bearer associated with the corresponding network slice information, and priority information on the corresponding network slice. Here, the network slice information configured for the UE may mean slice information configured for the UE by a network or slice information allowed by the network based on subscription information.

[152] The base station 500 may further include a transmitter 520 transmitting the network slice request information to the core network entity. The transmitter 520 may transmit the specific network slice information to a target base station. The specific network slice information transmitted to the target base station may be transmitted through the core network

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entity.

[153] Meanwhile, the controller 510 may control the overall operations of the base station 500 for receiving the network slice information from the UE and the core network entity, controlling the network slice information, and controlling the mobility of the UE.

[154] In addition, the transmitter 520 and the receiver 530 are used to transmit or receive signals, messages, data required to perform embodiments described above to or from the UE, the target base station and the core network entity.

[155] FIG. 6 is a block diagram illustrating a UE according to at least one embodiment of the present disclosure.

[156] Referring to FIG. 6, the UE 600 may include a controller 620 configuring (e.g., creating or generating) network slice information, a transmitter 630 transmitting network slice request information to a base station, and a receiver 610 receiving, from the base station, a handover command generated based on specific network slice information received by a target base station from a core network entity.

[157] The controller 620 may configure one or more network slices and configure one network slice to be associated with one protocol data unit (PDU).

[158] The transmitter 630 may transmit network slice request information through an radio resource control (RRC) connection setup message or a non-access stratum (NAS) message included in the RRC connection setup message.

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[159] Meanwhile, the controller 620 may configure a network slice through the base station or the core network entity and control the overall operations of the UE 600 for maintaining the continuity of a service through the network slice even when the UE moves.

[160] In addition, the transmitter 630 and the receiver 610 are used to transmit or receive signals, messages, data required to perform embodiments described above to or from the base station, the target base station and the core network entity.

[161] The standardized specifications or standard documents related to the embodiments described above constitute a part of the present disclosure. Accordingly, it should be construed that the incorporation of the content of the standardized specifications and part of the standard documents into the detailed description and claims is included within the scope of the present disclosure.

[162] Although a preferred embodiment of the present disclosure has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. Therefore, exemplary aspects of the present disclosure have not been described for limiting purposes, but to describe the embodiments, the therefore, the scope of the present disclosure shall not be limited to such embodiments. The scope of protection of the present disclosure should be construed based on the following claims, and all technical ideas within the scope of equivalents thereof should be construed as being

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included within the scope of the present disclosure.

[163]

[164] **CROSS-REFERENCE TO RELATED APPLICATION**

[165] If applicable, this application claims priority under 35 U.S.C §119(a) of Patent Application No. 10-2016-0146054, filed on November 03, 2016, and Patent Application No. 10-2017-0142205, filed on October 30, 2017, in Korea, the entire contents of which are incorporated herein by reference. In addition, this non-provisional application claims priorities in countries other than the U.S. for the same reason based on the Korean Patent Applications, the entire contents of which are hereby incorporated by reference.

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(12) 특허협력조약에 의하여 공개된 국제출원

(19) 세계지식재산권기구
국제사무국

(43) 국제공개일
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(71) 출원인: 주식회사 케이티 (KT CORPORATION) [KR/KR]; 13606 경기도 성남시 분당구 불정로 90 (정자동 206번지), Gyeonggi-do (KR).

(72) 발명자: 홍성표 (HONG, Sung-pyo); 06763 서울시 서초구 태봉로 151 (우면동, KT연구개발센터), Seoul (KR). 최우진 (CHOI, Woo-jin); 06763 서울시 서초구 태봉로 151 (우면동, KT연구개발센터), Seoul (KR).

(74) 대리인: 특허법인(유한)유일하이스트 (YUIL HIGHEST INTERNATIONAL PATENT AND LAW FIRM); 06130 서울시 강남구 강남대로94길 59, 2층(역삼동, 옥산빌딩), Seoul (KR).

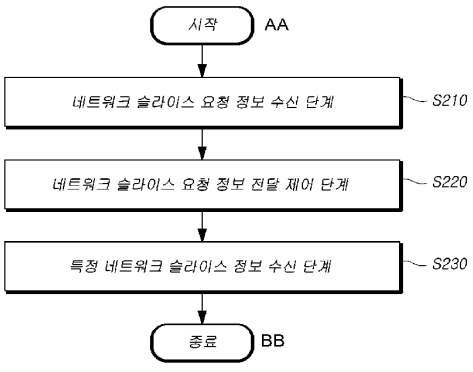
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공개:
— 국제조사보고서와 함께 (조약 제21조(3))

(54) **Title:** METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

(54) **발명의 명칭:** 네트워크 슬라이스 기반 데이터 처리 방법 및 그 장치



S210 ... Step of receiving network slice request information
S220 ... Step of controlling delivery of network slice request information
S230 ... Step of receiving specific network slice information
AA ... Start
BB ... End

(57) **Abstract:** The present disclosure relates to a technique for providing a network slice in a next generation mobile communication network, and relates to a technique for providing an uninterrupted service according to movement of a terminal using a network slice based service. One embodiment provides a method and an apparatus in which a base station controls transmission and reception of data through a network slice, the method comprising: a step of receiving network slice request information from a terminal in which a network slice is configured; a step of controlling so as to deliver the network slice request information to a core network entity; and a step of receiving, from the core network entity, specific network slice information configured on the basis of the network slice request information.

(57) **요약서:** 본 개시는 차세대 이동통신망에서 네트워크 슬라이스를 제공하는 기술에 관한 것으로, 네트워크 슬라이스 기반의 서비스를 이용하는 단말의 이동에 따라 서비스를 중단없이 제공하기 위한 기술에 관한 것이다. 일 실시예는 기지국이 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 방법에 있어서, 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 단계와 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 단계 및 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신하는 단계를 포함하는 방법 및 장치를 제공한다.

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명세서

발명의 명칭: 네트워크 슬라이스 기반 데이터 처리 방법 및 그 장치

기술분야

[1] 본 개시는 차세대 이동통신망에서 네트워크 슬라이스를 제공하는 기술에 관한 것으로, 네트워크 슬라이스 기반의 서비스를 이용하는 단말의 이동에 따라 서비스를 중단없이 제공하기 위한 기술에 관한 것이다.

배경기술

[2] 통신 시스템이 발전해나감에 따라 사업체들 및 개인들과 같은 소비자들은 매우 다양한 무선 단말기들을 사용하게 되었다.

[3] 현재의 3GPP 계열의 LTE(Long Term Evolution), LTE-Advanced, 5G 등의 이동통신 시스템에서는 음성 위주의 서비스를 벗어나 영상, 무선 데이터 등의 다양한 데이터를 송수신할 수 있는 고속 대용량의 통신 시스템이 요구되고 있다.

[4] 한편, LTE-Advanced 이후에 보다 많은 단말의 데이터 송수신을 수용하고, 보다 높은 QoS 제공을 위한 차세대 무선 접속 네트워크에 대한 기술이 개발되고 있다. 예를 들어, 3GPP를 중심으로 가칭 5G 네트워크에 대한 개발 작업이 진행되고 있다.

[5] 특히, 전술한 고속 대용량의 통신 시스템을 구축하기 위해서 종래 물리적인 네트워크 개체를 통해 코어망과 액세스 망을 구성하는 형태에서 벗어나 네트워크 자원활용의 효율성을 높이고, 다양한 요구사항을 가진 모바일 서비스를 효과적으로 수용하고 단말까지의 단대단 서비스 품질을 보장하기 위해 네트워크 슬라이싱(Network slicing) 기술을 적용한 서비스 지향 차세대 이동통신망에 대한 연구가 진행되고 있다.

[6] 다만, 네트워크 슬라이싱 기술을 적용하는 경우의 단말 이동성 보장 및 데이터 송수신 절차에 대해서는 구체적으로 논의가 되지 않고 있으며, 서비스 연속성 및 서비스 안정성을 제공하기 위해서는 구체적인 절차가 필수적으로 요구되는 실정이다.

발명의 상세한 설명

기술적 과제

[7] 전술한 배경에서 본 개시는 단말과 기지국이 네트워크 슬라이싱 기반 서비스를 구축하는 구체적인 절차 및 네트워크 슬라이스 기반 서비스를 이용하는 단말의 이동성 제어를 위한 절차를 제안하고자 한다.

과제 해결 수단

[8] 전술한 과제를 해결하기 위해서 안출된 일 실시예는 기지국이 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 방법에 있어서, 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 단계와 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는

단계 및 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신하는 단계를 포함하는 방법을 제공한다.

[9] 또한, 일 실시예는 단말이 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 방법에 있어서, 네트워크 슬라이스를 구성하는 단계와 네트워크 슬라이스 요청 정보를 기지국으로 전송하는 단계 및 타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 기지국으로부터 수신하는 단계를 포함하는 방법을 제공한다.

[10] 또한, 일 실시예는 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 기지국에 있어서, 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 수신부 및 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 제어부를 포함하되, 수신부는 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 더 수신하는 기지국 장치를 제공한다.

[11] 또한, 일 실시예는 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 단말에 있어서, 네트워크 슬라이스를 구성하는 제어부와 네트워크 슬라이스 요청 정보를 기지국으로 전송하는 송신부 및 타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 기지국으로부터 수신하는 수신부를 포함하는 단말 장치를 제공한다.

발명의 효과

[12] 이상에서 설명한 본 실시예들은 서비스 중단을 감소시키면서 네트워크 슬라이스를 통한 서비스를 제공하는 효과가 있다.

[13] 또한, 본 실시예들은 단말과 기지국이 네트워크 슬라이스를 통한 서비스를 제공하여 단말에 고속 대용량 데이터 처리가 가능하도록 하는 효과를 제공한다.

도면의 간단한 설명

[14] 도 1은 동일한 네트워크 인프라 내에서 구축된 복수 슬라이스의 예를 설명하기 위한 도면이다.

[15] 도 2는 일 실시예에 따른 기지국 동작을 설명하기 위한 도면이다.

[16] 도 3은 다른 실시예에 따른 기지국 동작을 설명하기 위한 도면이다.

[17] 도 4는 또 다른 실시예에 따른 단말 동작을 설명하기 위한 도면이다.

[18] 도 5는 또 다른 실시예에 따른 기지국 구성을 설명하기 위한 도면이다.

[19] 도 6은 또 다른 실시예에 따른 단말 구성을 설명하기 위한 도면이다.

발명의 실시를 위한 최선의 형태

[20] 이하, 본 발명의 일부 실시예들을 예시적인 도면을 통해 상세하게 설명한다. 각 도면의 구성요소들에 참조부호를 부가함에 있어서, 동일한 구성요소들에 대해서는 비록 다른 도면상에 표시되더라도 가능한 한 동일한 부호를 가지도록 하고 있음에 유의해야 한다. 또한, 본 발명을 설명함에 있어, 관련된 공지 구성

또는 기능에 대한 구체적인 설명이 본 발명의 요지를 흐릴 수 있다고 판단되는 경우에는 그 상세한 설명은 생략한다.

[21] 본 명세서에서 MTC 단말은 low cost(또는 low complexity)를 지원하는 단말 또는 coverage enhancement를 지원하는 단말 등을 의미할 수 있다. 본 명세서에서 MTC 단말은 low cost(또는 low complexity) 및 coverage enhancement를 지원하는 단말 등을 의미할 수 있다. 또는 본 명세서에서 MTC 단말은 low cost(또는 low complexity) 및/또는 coverage enhancement를 지원하기 위한 특정 카테고리로 정의된 단말을 의미할 수 있다.

[22] 다시 말해 본 명세서에서 MTC 단말은 LTE 기반의 MTC 관련 동작을 수행하는 새롭게 정의된 3GPP Release-13 low cost(또는 low complexity) UE category/type을 의미할 수 있다. 또는 본 명세서에서 MTC 단말은 기존의 LTE coverage 대비 향상된 coverage를 지원하거나, 혹은 저전력 소모를 지원하는 기존의 3GPP Release-12 이하에서 정의된 UE category/type, 혹은 새롭게 정의된 Release-13 low cost(또는 low complexity) UE category/type을 의미할 수 있다.

[23] 본 발명에서의 무선통신시스템은 음성, 패킷 데이터 등과 같은 다양한 통신 서비스를 제공하기 위해 널리 배치된다. 무선통신시스템은 사용자 단말(User Equipment, UE) 및 기지국(Base Station, BS, 또는 eNB)을 포함한다. 본 명세서에서의 사용자 단말은 무선 통신에서의 단말을 의미하는 포괄적 개념으로서, WCDMA 및 LTE, HSPA 등에서의 UE(User Equipment)는 물론, GSM에서의 MS(Mobile Station), UT(User Terminal), SS(Subscriber Station), 무선기기(wireless device) 등을 모두 포함하는 개념으로 해석되어야 할 것이다.

[24] 기지국 또는 셀(cell)은 일반적으로 사용자 단말과 통신하는 지점(station)을 말하며, 노드-B(Node-B), eNB(evolved Node-B), 섹터(Sector), 싸이트(Site), BTS(Base Transceiver System), 액세스 포인트(Access Point), 릴레이 노드(Relay Node), RRH(Remote Radio Head), RU(Radio Unit), small cell 등 다른 용어로 불릴 수 있다.

[25] 즉, 본 명세서에서 기지국 또는 셀(cell)은 CDMA에서의 BSC(Base Station Controller), WCDMA의 NodeB, LTE에서의 eNB 또는 섹터(싸이트) 등이 커버하는 일부 영역 또는 기능을 나타내는 포괄적인 의미로 해석되어야 하며, 메가셀, 매크로셀, 마이크로셀, 피코셀, 펨토셀 및 릴레이 노드(relay node), RRH, RU, small cell 통신범위 등 다양한 커버리지 영역을 모두 포괄하는 의미이다.

[26] 상기 나열된 다양한 셀은 각 셀을 제어하는 기지국이 존재하므로 기지국은 두 가지 의미로 해석될 수 있다. i) 무선 영역과 관련하여 메가셀, 매크로셀, 마이크로셀, 피코셀, 펨토셀, 스몰 셀을 제공하는 장치 그 자체이거나, ii) 상기 무선영역 그 자체를 지시할 수 있다. i)에서 소정의 무선 영역을 제공하는 장치들이 동일한 개체에 의해 제어되거나 상기 무선 영역을 협업으로 구성하도록 상호작용하는 모든 장치들을 모두 기지국으로 지시한다. 무선 영역의 구성 방식에 따라 eNB, RRH, 안테나, RU, LPN, 포인트, 송수신포인트,

송신 포인트, 수신 포인트 등은 기지국의 일 실시예가 된다. ii)에서 사용자 단말의 관점 또는 이웃하는 기지국의 입장에서 신호를 수신하거나 송신하게 되는 무선 영역 그 자체를 기지국으로 지시할 수 있다.

[27] 따라서, 메가셀, 매크로셀, 마이크로셀, 피코셀, 펨토셀, 스몰 셀, RRH, 안테나, RU, LPN(Low Power Node), 포인트, eNB, 송수신포인트, 송신 포인트, 수신 포인트를 통칭하여 기지국으로 지칭한다.

[28] 본 명세서에서 사용자 단말과 기지국은 본 명세서에서 기술되는 기술 또는 기술적 사상을 구현하는데 사용되는 누 가지 송수신 주체로 포괄적인 의미로 사용되며 특정하게 지칭되는 용어 또는 단어에 의해 한정되지 않는다. 사용자 단말과 기지국은, 본 발명에서 기술되는 기술 또는 기술적 사상을 구현하는데 사용되는 두 가지(Uplink 또는 Downlink) 송수신 주체로 포괄적인 의미로 사용되며 특정하게 지칭되는 용어 또는 단어에 의해 한정되지 않는다. 여기서, 상향링크(Uplink, UL, 또는 업링크)는 사용자 단말에 의해 기지국으로 데이터를 송수신하는 방식을 의미하며, 하향링크(Downlink, DL, 또는 다운링크)는 기지국에 의해 사용자 단말로 데이터를 송수신하는 방식을 의미한다.

[29] 무선통신시스템에 적용되는 다중 접속 기법에는 제한이 없다. CDMA(Code Division Multiple Access), TDMA(Time Division Multiple Access), FDMA(Frequency Division Multiple Access), OFDMA(Orthogonal Frequency Division Multiple Access), OFDM-FDMA, OFDM-TDMA, OFDM-CDMA와 같은 다양한 다중 접속 기법을 사용할 수 있다. 본 발명의 일 실시예는 GSM, WCDMA, HSPA를 거쳐 LTE 및 LTE-advanced로 진화하는 비동기 무선통신과, CDMA, CDMA-2000 및 UMB로 진화하는 동기식 무선 통신 분야 등의 자원할당에 적용될 수 있다. 본 발명은 특정한 무선통신 분야에 한정되거나 제한되어 해석되어서는 아니 되며, 본 발명의 사상이 적용될 수 있는 모든 기술분야를 포함하는 것으로 해석되어야 할 것이다.

[30] 상향링크 전송 및 하향링크 전송은 서로 다른 시간을 사용하여 전송되는 TDD(Time Division Duplex) 방식이 사용될 수 있고, 또는 서로 다른 주파수를 사용하여 전송되는 FDD(Frequency Division Duplex) 방식이 사용될 수 있다.

[31] 또한, LTE, LTE-advanced와 같은 시스템에서는 하나의 반송파 또는 반송파 쌍을 기준으로 상향링크와 하향링크를 구성하여 규격을 구성한다. 상향링크와 하향링크는, PDCCH(Physical Downlink Control CHannel), PCFICH(Physical Control Format Indicator CHannel), PHICH(Physical Hybrid ARQ Indicator CHannel), PUCCH(Physical Uplink Control CHannel), EPDCCH(Enhanced Physical Downlink Control CHannel) 등과 같은 제어채널을 통하여 제어정보를 전송하고, PDSCH(Physical Downlink Shared CHannel), PUSCH(Physical Uplink Shared CHannel) 등과 같은 데이터채널로 구성되어 데이터를 전송한다.

[32] 한편 EPDCCH(enhanced PDCCH 또는 extended PDCCH)를 이용해서도 제어 정보를 전송할 수 있다.

[33] 본 명세서에서 셀(cell)은 송수신 포인트로부터 전송되는 신호의 커버리지 또는 송수신 포인트(transmission point 또는 transmission/reception point)로부터 전송되는 신호의 커버리지를 가지는 요소 반송파(component carrier), 그 송수신 포인트 자체를 의미할 수 있다.

[34] 실시예들이 적용되는 무선통신 시스템은 둘 이상의 송수신 포인트들이 협력하여 신호를 전송하는 다중 포인트 협력형 송수신 시스템(coordinated multi-point transmission/reception System; CoMP 시스템) 또는 협력형 다중 안테나 전송방식(coordinated multi-antenna transmission system), 협력형 다중 셀 통신시스템일 수 있다. CoMP 시스템은 적어도 두 개의 다중 송수신 포인트와 단말들을 포함할 수 있다.

[35] 다중 송수신 포인트는 기지국 또는 매크로 셀(macro cell, 이하 'eNB'라 함)과, eNB에 광케이블 또는 광섬유로 연결되어 유선 제어되는, 높은 전송파워를 갖거나 매크로 셀영역 내의 낮은 전송파워를 갖는 적어도 하나의 RRH일 수도 있다.

[36] 이하에서 하향링크(downlink)는 다중 송수신 포인트에서 단말로의 통신 또는 통신 경로를 의미하며, 상향링크(uplink)는 단말에서 다중 송수신 포인트로의 통신 또는 통신 경로를 의미한다. 하향링크에서 송신기는 다중 송수신 포인트의 일부분일 수 있고, 수신기는 단말의 일부분일 수 있다. 상향링크에서 송신기는 단말의 일부분일 수 있고, 수신기는 다중 송수신 포인트의 일부분일 수 있다.

[37] 이하에서는 PUCCH, PUSCH, PDCCH, EPDCCH 및 PDSCH 등과 같은 채널을 통해 신호가 송수신되는 상황을 'PUCCH, PUSCH, PDCCH, EPDCCH 및 PDSCH를 전송, 수신한다'는 형태로 표기하기도 한다.

[38] 또한 이하에서는 PDCCH를 전송 또는 수신하거나 PDCCH를 통해서 신호를 전송 또는 수신한다는 기재는 EPDCCH를 전송 또는 수신하거나 EPDCCH를 통해서 신호를 전송 또는 수신하는 것을 포함하는 의미로 사용될 수 있다.

[39] 즉, 이하에서 기재하는 물리 하향링크 제어채널은 PDCCH를 의미하거나, EPDCCH를 의미할 수 있으며, PDCCH 및 EPDCCH 모두를 포함하는 의미로도 사용된다.

[40] 또한, 설명의 편의를 위하여 PDCCH로 설명한 부분에도 본 발명의 일 실시예인 EPDCCH를 적용할 수 있으며, EPDCCH로 설명한 부분에도 본 발명의 일 실시예로 EPDCCH를 적용할 수 있다.

[41] 한편, 이하에서 기재하는 상위계층 시그널링(High Layer Signaling)은 RRC 파라미터를 포함하는 RRC 정보를 전송하는 RRC시그널링을 포함한다.

[42] eNB은 단말들로 하향링크 전송을 수행한다. eNB은 유니캐스트 전송(unicast transmission)을 위한 주 물리 채널인 물리 하향링크 공유채널(Physical Downlink Shared Channel, PDSCH), 그리고 PDSCH의 수신에 필요한 스케줄링 등의 하향링크 제어 정보 및 상향링크 데이터 채널(예를 들면 물리 상향링크 공유채널(Physical Uplink Shared Channel, PUSCH))에서의 전송을 위한 스케줄링

승인 정보를 전송하기 위한 물리 하향링크 제어채널(Physical Downlink Control Channel, PDCCH)을 전송할 수 있다. 이하에서는, 각 채널을 통해 신호가 송수신 되는 것을 해당 채널이 송수신되는 형태로 기재하기로 한다.

[43] 무선 통신 시스템에서 적용되는 다중 접속 기법에는 제한이 없다. TDMA(Time Division Multiple Access), FDMA(Frequency Division Multiple Access), CDMA(Code Division Multiple Access), OFDMA(Orthogonal Frequency Division Multiple Access), NOMA(Non-Orthogonal Multiple Access), OFDM-TDMA, OFDM-FDMA, OFDM-CDMA와 같은 다양한 다중 접속 기법을 사용할 수 있다. 여기서, NOMA는 SCMA(Sparse Code Multiple Access)와 LDS(Low Density Spreading) 등을 포함한다.

[44] 본 발명의 일 실시예는 GSM, WCDMA, HSPA를 거쳐 LTE/LTE-Advanced, IMT-2020으로 진화하는 비동기 무선 통신과, CDMA, CDMA-2000 및 UMB로 진화하는 동기식 무선 통신 분야 등의 자원 할당에 적용될 수 있다. 본 명세서에서 MTC(Machine Type Communication) 단말은 low cost(또는 low complexity)를 지원하는 단말 또는 coverage enhancement를 지원하는 단말 등을 의미할 수 있다. 또는 본 명세서에서 MTC 단말은 low cost(또는 low complexity) 및/또는 coverage enhancement를 지원하기 위한 특정 카테고리로 정의된 단말을 의미할 수 있다. 다시 말해 본 명세서에서 MTC 단말은 LTE 기반의 MTC 관련 동작을 수행하는 새롭게 정의된 3GPP Release-13 low cost(또는 low complexity) UE category/type을 의미할 수 있다. 또는 본 명세서에서 MTC 단말은 기존의 LTE coverage 대비 향상된 coverage를 지원하거나, 혹은 저전력 소모를 지원하는 기존의 3GPP Release-12 이하에서 정의된 UE category/type, 혹은 새롭게 정의된 Release-13 low cost(또는 low complexity) UE category/type을 의미할 수 있다. 또는, Release-14에서 정의된 further Enhanced MTC 단말을 의미할 수도 있다.

[45] 본 명세서에서 NB-IoT(NarrowBand Internet of Things) 단말은 셀룰러 IoT를 위한 무선 액세스를 지원하는 단말을 의미한다. NB-IoT 기술의 목적은 향상된 인도어(Indoor) 커버리지, 대규모의 저속 단말에 대한 지원, 저지연민감도, 초저가 단말 비용, 낮은 전력 소모, 그리고 최적화된 네트워크 구조를 포함한다.

[46] 3GPP에서 최근 논의 중인 NR(New Radio)에서 대표적인 사용 시나리오(usage scenario)로서, eMBB(enhanced Mobile BroadBand), mMTC(massive Machine Type Communication), URLLC(Ultra Reliable and Low Latency Communication)가 제기되고 있다. 본 명세서에서 NR(New Radio)과 관련한 주파수, 프레임, 서브프레임, 자원, 자원블럭, 영역(region), 밴드, 서브밴드, 제어채널, 데이터채널, 동기신호, 각종 참조신호, 각종 신호, 각종 메시지는 과거 또는 현재 사용되는 의미 또는 장래 사용되는 다양한 의미로 해석될 수 있다.

[47] 이하에서 설명하는 실시예는 차세대 이동통신(5G 이동통신, New-RAT, NR)을 사용하는 단말, 기지국, 코어망 개체(예를 들어, MME, AMF 등)에 적용될 수 있다. 설명의 편의를 위해 이하에서 기지국은 중앙 유닛(CU, Central Unit)과 분산

유닛(DU, Distributed Unit)이 분리된 5G 무선망에서의 기지국(CU, DU, 또는 CU와 DU가 하나의 논리적인 개체로 구현된 개체), gNB를 나타낼 수 있다.

[48] 또한, 본 명세서에서 기재하는 중앙 유닛 및 분산 유닛은 하나의 기지국에 포함된 중앙 유닛 및 분산 유닛을 의미하며, 하나의 중앙 유닛에 대하여 이와 연결된 하나 이상의 분산 유닛이 있을 수 있다. 그러므로 이후에 서술하는 분산 유닛은 중앙 유닛에 연결된 하나 이상의 분산 유닛의 집합 중 특정한 분산 유닛을 의미할 수 있다. 또한, 본 명세서에서 기재하는 서비스는 단말이 기지국을 통해 네트워크에 연결되어, 네트워크 자원을 활용하여 구성되는 네트워크 서비스 전반을 의미할 수 있다. 그리고 이러한 서비스는 후술할 단대단 네트워크 슬라이스를 통해 제공될 수 있다.

[49] 4세대 이동통신망(예를 들어, LTE)과 같은 종래의 이동통신망은 물리적인 네트워크 엔티티들을 통해 코어망과 액세스망을 구성하고 있다. 이에 따라 네트워크 자원활용의 효율성이 떨어지고 네트워크 구성 변경이 용이하지 않다. 최근, 다양한 요구사항을 가진 모바일 서비스를 효과적으로 수용하고 단말까지의 단대단 서비스 품질을 보장하기 위해 네트워크 슬라이싱(Network slicing) 기술을 적용한 서비스 지향 차세대 이동통신망에 대한 논의가 활발하게 진행되고 있다.

[50] 네트워크 슬라이싱이란 네트워크 가상화 기술을 활용하여 네트워크를 다수개의 가상화 네트워크로 나누고, 서비스별 또는 가입자별로 별도의 논리적인 네트워크를 구성관리함으로써 유연성을 향상시킬 수 있는 기술이다. 네트워크 슬라이싱을 이용하면 가상화된 네트워크 자원 풀에서 서비스 유형별로 필요한 자원을 할당 받을 수 있기 때문에, 신규 서비스 도입시 물리적인 네트워크 구축없이도 신속하게 서비스를 제공할 수 있으며, 한정된 물리적인 망자원을 효율적으로 활용할 수 있다. 이와 같이 네트워크 슬라이싱은 독립적인 네트워크 인프라를 구축하는 것에 비해 각각의 슬라이스 인스탄스가 공유된 인프라에 서 논리적인 네트워크로 실현되는 것이 가능하다.

[51] 도 1은 동일한 네트워크 인프라 내에서 구축된 복수 슬라이스의 예를 설명하기 위한 도면이다.

[52] 도 1을 참조하면, 기존 MBB(Mobile Broadband)를 통한 노트북 인터넷 연결 서비스, MTC 기술을 이용하는 전력량계의 데이터 서비스, 경찰의 헬멧과 경찰차에 거치되는 비디오 카메라와 노트북 등을 위한 서비스 및 MTC 감지기의 데이터 서비스 등이 동일 네트워크 인프라내의 복수의 슬라이스를 통해서 개별적으로 서비스 될 수 있다. 이와 같이, 개별 서비스 별로 네트워크를 슬라이스하여 제공함으로써 네트워크 활용성 등이 증가될 수 있다.

[53] 네트워크 슬라이싱은 각각의 고객 요구에 따른 차별화된 처리를 가능하게 한다. 슬라이싱을 통해 오퍼레이터는 고객들을 서로 다른 서비스요구사항을 가지는 서로 다른 tenant type에 속하도록 하는 것이 가능하다.(Network Slicing allow differentiated treatment depending on each customer requirements. With slicing,

it is now possible for Mobile Network Operators (MNO) to consider customers as belonging to different tenant types with each having different service requirements that govern in terms of what slice types each tenant is eligible to use based on Service Level Agreement (SLA) and subscriptions.)

[54] 단말이 공유된 인프라 상에서 제공되는 특정 네트워크 슬라이스 또는 하나 이상의 네트워크 슬라이스를 통해 데이터 송수신을 하기 위해서는 이를 위한 구체적인 프로시져가 제공되어야 한다. 하지만 현재 이를 위한 구체적인 방법은 제공되지 않았다. 특히 이동통신 단말은 이동성을 기본으로 한다. 단말이 이동함에 따라 전술한 특정 네트워크 슬라이스 또는 하나 이상의 네트워크 슬라이스를 통해 서비스 중단 없이 데이터를 송수신하기 위해서는 이를 위한 구체적인 방법이 제공되어야 하지만, 이에 대해서는 구체적 방법이 제공되지 않았다. 이에 따라, 단말의 이동에 따라 셀 변경이 발생할 때 서비스의 연속성을 보장할 수 없었다.

[55] 이러한 문제점을 해결하기 위해 안출된 본 개시는 이동통신망에서 네트워크 슬라이싱 기반의 데이터 송수신 방법 및 장치를 제공한다. 또한, 단말이 셀 간 이동에 따라 서비스 중단을 최소화하면서 네트워크 슬라이싱 기반의 데이터를 송수신할 수 있는 방법 및 장치를 제공한다.

[56] 이하에서 본 실시예의 구체적인 방법에 대해 설명한다. 이하에서 설명하는 방법은 개별적으로 또는 각각의 방법을 조합하여 사용될 수 있다.

[57] LTE에서 셀은 "combination of downlink and optionally uplink resources"으로 정의되어 있다. LTE에서 셀은 동기화(Synchronization depends on PSS/SSS and allows the UE to acquire the encoded PCI and the frame timing for reception of all downlink transmissions and for all uplink transmissions (in addition to the uplink timing advance, for uplink transmissions). In this sense, all downlink transmissions which are time aligned with PSS/SSS and all uplink transmissions using the PSS/SSS as timing reference belong to a cell.), 셀간간섭억제(In order to suppress interference from neighbour cells, all downlink transmissions are scrambled with (for physical channels) or determined by (for reference signals) a specific sequence. For most downlink transmissions, the corresponding sequence is associated to the PCI, which value is determined from the sequence visible from PSS/SSS. Using different PCI values for neighbour cells allows different downlink transmissions to use different sequences.), 시스템정보(After synchronization to the network, the UE acquires the cell reference symbols (CRS) which allows decoding the PBCH carrying the MIB. According to the MIB, the UE knows the cell bandwidth, PHICH and SFN. After acquiring the MIB and the PCFICH, the UE knows exactly the location of control channel, i.e. PDCCH and can acquire system information. From L3 perspective, system information is a set of parameters associated to each other as part of "a cell". All these signals and channels are using a sequence determined by the value of the

PCI, which is the same for all.), 데이터 전송(Data transmission in LTE is controlled by information transmitted on PDCCH. The UE is allocated at least a C-RNTI, which is implicitly encoded in control indications (either downlink, DCI, or uplink, UCI) via a CRC calculation. As for data, they are scrambled using a sequence determined by the PCI but also by the UE RNTI also providing some randomization of transmissions accross multiple UEs, which can be useful e.g. in case of spatial multiplexing.), 측정 및 핸드오버(When the UE is in RRC_CONNECTED, the UE is configured with DL measurement gap and measurement events in order to prepare handover as the UE is moving. The measurement process includes synchronization and reading of CRS and PCI is used to identify different cells.) 프로시져에 관련된다.

[58] 차세대 이동통신 네트워크(New Radio Technology Network 또는 5G 네트워크, 설명의 편의를 위해 이하에서 NR로 표기함)에서도 셀에 대한 개념을 정의할 필요가 있다. 예를 들어, NR에 대해서 하나의 NR 셀은 아래에서 언급하는 프로시져 중 하나 이상과 연관될 수 있다.

[59] - DL synchronization signals deriving identical NR cell ID;

[60] - identical System information distribution for at least Minimum SI;

[61] - efficient use of all possible types of multi-TRP operation;

[62] - downlink/uplink physical channels/signals towards a connected UE are identical/valid in more than one TRP.

[63] 하나의 NR 셀은 단일 시스템 정보 셋, barring 그리고 동일한 트래킹 영역 중 하나 이상을 가질 수 있다. NR 셀이 하나 이상의 TRP(Transmission Reception Point)로 구성되면 모든 TRPs는 동일한 시스템 정보를 전송할 수 있다.(An NR Cell has a single set of system information, barring and same tracking area. In the case that a single NR Cell consists of more than one TRP then all the TRPs transmit the same system information.)

[64] NR 셀은 슬라이스 정보와 유연하게 연계될 수 있다. 예를 들어 하나의 NR 셀은 하나의 전용 슬라이스 정보를 지원할 수도 있고, 복수의 서로다른 슬라이스 정보를 지원할 수도 있다. NR셀들은 이웃들에 관한 서로 다른 슬라이스 정보를 지원할 수도 있다. 여기서 슬라이스 정보는 슬라이스 유형 또는 tenant type 또는 슬라이스 ID(Identity) 또는 tenant ID 또는 MDD(multi-dimensional descriptor)정보 또는 슬라이스 서비스 또는 슬라이스 서비스 정보 또는 슬라이스 구성정보 또는 슬라이스 특성 정보 또는 해당 슬라이스의 RAN function(임의의 NR functions, 임의의 E-UTRAN functions) 또는 해당 슬라이스의 RAN function list를 구분/식별/기술하기 위한 정보를 나타낼 수 있다. 설명의 편의를 위해 이하에서 이를 슬라이스 정보로 표기한다. 이는 설명의 편의를 위한 것으로 NR에서 특정 네트워크 슬라이스를 구분/식별/기술(describe)/구성하기 위한 임의의 정보도 본 실시예의 범주에 포함된다. 예를 들어 하나의 네트워크 슬라이스를 식별하기 위한 정보를 슬라이스 정보로 표기할 수 있다.

[65] 하나의 네트워크 슬라이스를 식별하는 슬라이스 정보는 슬라이스 서비스 유형(Slice Service Type)정보 및 슬라이스 특성정보(Slice Differentiator)로 구성될 수 있다. 슬라이스 특성정보는 동일한 슬라이스 서비스 유형 간의 차이를 나타내는 정보를 포함한다. 일 예로 eMBB(enhanced Mobile Broadband) 서비스를 하나의 슬라이스 서비스 유형으로 지정할 수 있다. 다른 예로 URLLC(Ultra-Reliable Low Latency Communication) 서비스를 하나의 슬라이스 서비스 유형으로 지정할 수 있다. 다른 예로 IoT 서비스를 하나의 슬라이스 서비스 유형으로 지정할 수 있다. 다른 예로 eMBB 슬라이스 서비스 유형 내에서 음성 서비스를 지원하기 위한 슬라이스 특성정보를 지정할 수 있다. 다른 예로 eMBB 슬라이스 서비스 유형 내에서 영상 서비스를 지원하기 위한 슬라이스 특성정보를 지정할 수 있다.

[66] 특정한 하나의 슬라이스 정보 또는 하나 이상의 슬라이스 정보를 가진(또는 이에 연계된 또는 이를 가지고 구성된) 단말(이하에서 설명의 편의를 위해 특정 슬라이스가 구성된 단말로 표기함)이 해당 슬라이스 정보를 가진 NR 셀/네트워크(이하에서 설명의 편의를 위해 슬라이스가 구성된 셀/네트워크로 표기)에 액세스하도록 하기 위해, 슬라이스가 구성된 네트워크는 관련된 도움 정보를 제공할 수 있다.

[67] 일 예를 들어, NR 셀은 슬라이스 정보를 단말에 제공할 수 있다. 일 예로 시스템 정보를 통해 브로드캐스트할 수 있다. 다른 예로 RRC 전용 시그널링을 통해 단말에 지시할 수 있다. 이 정보를 통해 단말은 구성된(또는 단말이 속한 또는 단말에 연계된 또는 단말이 가입한) 슬라이스를 제공하는 NR셀을 선택할 수 있다.

[68] 다른 예를 들어, NR 셀은 이웃 셀의 슬라이스 정보를 단말에 제공할 수 있다. 일 예로 시스템 정보를 통해 브로드캐스트할 수 있다. 다른 예로 RRC 전용 시그널링을 통해 단말에 지시할 수 있다. 이 정보를 통해 단말은 구성된(또는 단말이 속한 또는 단말에 연계된 또는 단말이 가입한) 슬라이스를 제공하는 NR셀을 선택/재선택할 수 있다.

[69] 한편, 네트워크 슬라이스를 통해 제공되는 특정 슬라이스가 구성된 단말이 셀간 이동할 때(또는 기지국간 이동 또는 다른 기지국 셀로 이동할 때), 서비스 중단을 감소시기 위해 서비스 연속성(service continuity) 지원 기술이 제공될 수 있다. 가능한 서비스 시나리오의 일 예는 다음과 같다.

[70] 시나리오1: 네트워크 슬라이싱 지원 셀에서 네트워크 슬라이싱을 지원하지 않는 셀로 이동하는 시나리오

[71] 단말은, 소스 셀(또는 현재 셀 또는 캠핑한 셀)에 있는 동안, 이웃 셀의 네트워크 슬라이싱 관련 시스템 정보 또는 네트워크 슬라이싱 관련 최소 시스템 정보에 연계된 On 디맨드 시스템 정보 또는 이웃 셀의 네트워크 슬라이싱 지원 여부를 확인할 수 있는 RRC 전용 시그널링(예를 들어 RRC Release 메시지) 상의 지시정보에 기반하여 단말이 이동하려고 하는 이웃 셀이 특정 네트워크

슬라이스를 지원/허용하는지 여부를 알 수 있다.

[72] 만약 단말이 이동하려고 하는 이웃 셀이 특정 네트워크 슬라이스를 지원/허용하지 않는다면, 단말은 소스 셀에서 네트워크 슬라이싱을 통해 데이터를 송수신하면서 유니캐스트를 통해 특정 네트워크 슬라이스를 지원하기 위한 애플리케이션 서버로 네트워크 슬라이싱 서비스를 요청하거나, 또는 특정 네트워크 슬라이스를 지원/허용하는 셀을 리셀렉트하거나, 또는 특정 네트워크 슬라이스를 지원/허용하지 않는 셀의 셀리셀렉션 우선순위를 낮은 우선순위로 하여 셀리셀렉션을 수행 할 수 있다. 이를 위해 NR 셀은 이웃 셀의 특정 네트워크 슬라이스 지원/허용여부에 따라 셀리셀렉션 우선순위를 다르게 하여 단말로 지시할 수 있다. 단말은 단말에 구성된 특정 네트워크 슬라이스를 지원/허용하는 셀을 우선하여 셀리셀렉션을 수행할 수 있다. 만약 하나 이상의 구성된 네트워크 슬라이스가 존재하는 경우, 단말은 코어망 개체에 의해 구성된/허용된/지시된 네트워크 슬라이스 우선 순위 정보에 따라 높은 우선순위를 가진 네트워크 슬라이스에 대한 셀리셀렉션 우선순위를 기반으로 셀리셀렉션을 수행할 수 있다.

[73] 시나리오2: 네트워크 슬라이싱 지원/허용 셀에서 네트워크 슬라이싱 지원/허용 셀로 이동하는 시나리오

[74] 단말은, 소스 셀(또는 현재 셀 또는 캠핑한 셀)에 있는 동안, 이웃 셀의 네트워크 슬라이싱 관련 시스템 정보 또는 네트워크 슬라이싱 관련 최소 시스템 정보에 연계된 On 디맨드 시스템 정보 또는 이웃 셀의 네트워크 슬라이싱 지원 여부를 확인할 수 있는 RRC 전용 시그널링(예를 들어 RRC Release 메시지) 상의 지시정보에 기반하여 단말이 이동하려고 하는 이웃 셀이 특정 네트워크 슬라이스를 지원/허용하는지 여부를 알 수 있도록 할 수 있다. 이를 위해 NR 셀은 이웃 셀의 특정 네트워크 슬라이스 지원/허용여부에 따라 셀리셀렉션 우선순위를 다르게 하여 단말로 지시할 수 있다. 이를 통해 단말은 특정 네트워크 슬라이스를 지원/허용하는 셀을 우선하여 셀리셀렉션을 수행할 수 있다.

[75] 이하에서는 단말과 기지국이 네트워크 슬라이스를 구성하고, 단말의 이동성을 제어하기 위한 동작을 기지국과 단말 동작 중심으로 설명한다. 아래에서 설명하는 기지국과 단말 동작은 일 실시예에 관한 것으로, 본 명세서에서 기재하는 다른 실시예의 동작도 기지국과 단말은 수행할 수 있다.

[76] 도 2는 일 실시예에 따른 기지국 동작을 설명하기 위한 도면이다.

[77] 도 2를 참조하면, 기지국은 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 단계를 수행할 수 있다(S210). 예를 들어, 단말은 브로드캐스트되는 시스템 정보 또는 RRC 연결 재구성 메시지를 통해서 수신되는 네트워크 슬라이스 정보를 통해서 단말에 하나 또는 복수의 네트워크 슬라이스를 구성할 수 있다. 또는 단말은 미리 설정된 네트워크 슬라이스 정보를 이용하여 단말에 네트워크 슬라이스를 구성할 수도 있다. 하나의 네트워크

슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되어 구성될 수 있다.

[78] 기지국이 단말로부터 수신하는 네트워크 슬라이스 요청 정보는 RRC(Radio Resource Control) 연결 셋업 메시지에 포함될 수 있다. 또는 네트워크 슬라이스 요청 정보는 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함될 수도 있다.

[79] 또한, 네트워크 슬라이스 요청 정보는 단말에 구성된 특정 네트워크 슬라이스 정보를 포함할 수 있다. 예를 들어, 네트워크 슬라이스 요청 정보는 단말에 구성된 네트워크 슬라이스 정보, 해당 네트워크 슬라이스 정보에 연계된 네트워크 슬라이스 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 해당 네트워크 슬라이스에 대한 우선순위 정보 중 하나 이상의 정보를 포함할 수 있다. 여기서 단말에 구성된 네트워크 슬라이스 정보는 네트워크에 의해서 단말에 구성된 슬라이스 정보 또는 가입정보를 기반으로 네트워크에 의해서 허용되는 슬라이스 정보를 의미한다.

[80] 기지국은 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 단계를 수행할 수 있다(S220). 예를 들어, 기지국은 단말로부터 네트워크 슬라이스 요청 정보를 수신하면, 이를 코어망 개체로 전달하도록 제어할 수 있다. 이는 해당 단말이 해당 네트워크 슬라이스 요청 정보에 포함되는 네트워크 슬라이스 정보에 대한 권한, 인증, 확인을 위한 것으로 기지국은 이를 위해서 코어망 개체로 네트워크 슬라이스 요청 정보를 전송한다.

[81] 기지국은 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신하는 단계를 수행할 수 있다(S230). 기지국은 네트워크 슬라이스 요청 정보를 코어망 개체로 전송한 후, 코어망 개체로부터 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 수신할 수 있다. 일 예로, 특정 네트워크 슬라이스 정보는 코어망 개체가 네트워크 슬라이스 요청 정보 및 가입정보에 기초하여 확인한 것으로, 단말 컨택스트 정보에 포함되어 수신될 수 있다.

[82] 코어망 개체는 네트워크 슬라이스 요청 정보를 수신하고, 단말이 해당 네트워크 슬라이스에 액세스할 권한이 있는지에 대한 유효성을 검증할 수 있다. 또는, 코어망 개체는 가입자 정보 서버를 통한 가입 정보 등에 포함된 값에 따라 특정 구성된 네트워크 슬라이스 정보를 포함하는 단말 컨택스트 정보를 기지국으로 전송할 수 있다. 예를 들어, 코어망 개체가 전송하는 단말 컨택스트 정보는 네트워크 슬라이스 관련 정보 또는 구성된 네트워크 슬라이스 정보를 포함할 수 있다. 여기서, 네트워크 슬라이스 관련 정보는 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 네트워크 슬라이스에 연계된 PDU 세션의 베어러 정보 중 적어도 하나를 포함할 수 있다.

[83] 이와 같은 과정을 통해서, 코어망 개체는 단말의 네트워크 슬라이스를 통한 서비스를 제어할 수 있고, 네트워크 슬라이스를 통한 데이터 송수신을 제어할 수

있다.

[84] 도 3은 다른 실시예에 따른 기지국 동작을 설명하기 위한 도면이다.

[85] 도 3을 참조하면, 기지국은 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 단계(S210)와 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 단계(S220)와 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신하는 단계(S230) 및 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송하는 단계(S340)를 수행할 수 있다.

[86] 여기서, S210 단계 내지 S230 단계는 도 2를 참조하여 위에서 설명한 내용과 동일하게 수행될 수 있다.

[87] 기지국은 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신한 이후, 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송할 수 있다. 일 예로, 기지국은 코어망 개체를 통해서 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송할 수 있다. 다른 예로, 기지국은 타켓 기지국과의 인터페이스를 통해서 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송할 수 있다.

[88] 타켓 기지국은 특정 네트워크 슬라이스 정보를 수신하면, 특정 네트워크 슬라이스 정보 및 타켓 기지국이 허용하는 네트워크 슬라이스 정보 중 적어도 하나에 기초하여 해당 단말의 핸드오버 명령을 생성할 수 있다. 핸드오버 명령을 타켓 기지국이 기지국으로 전달하여 단말로 전송될 수 있다. 즉, 단말은 소스 기지국으로부터 핸드오버 명령을 수신한다.

[89] 도 4는 또 다른 실시예에 따른 단말 동작을 설명하기 위한 도면이다.

[90] 도 4를 참조하면, 단말은 네트워크 슬라이스를 구성하는 단계를 수행할 수 있다(S410). 예를 들어, 단말은 브로드캐스트되는 시스템 정보 또는 RRC 연결 재구성 메시지를 통해서 수신되는 네트워크 슬라이스 정보를 통해서 단말에 하나 또는 복수의 네트워크 슬라이스를 구성할 수 있다. 또는 단말은 미리 설정된 네트워크 슬라이스 정보를 이용하여 단말에 네트워크 슬라이스를 구성할 수도 있다. 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되어 구성될 수 있다. 따라서, 단말은 하나 또는 복수의 네트워크 슬라이스를 구성할 수 있다.

[91] 단말은 네트워크 슬라이스 요청 정보를 기지국으로 전송하는 단계를 수행할 수 있다(S420). 네트워크 슬라이스 요청 정보는 RRC(Radio Resource Control) 연결 셋업 메시지에 포함될 수 있다. 또는 네트워크 슬라이스 요청 정보는 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함될 수도 있다. 즉, 단말은 상위계층 시그널링을 통해서 네트워크 슬라이스 요청 정보를 전송할 수 있다.

[92] 네트워크 슬라이스 요청 정보는 단말에 구성된 특정 네트워크 슬라이스 정보를 포함할 수 있다. 예를 들어, 네트워크 슬라이스 요청 정보는 단말에 구성된 네트워크 슬라이스 정보, 해당 네트워크 슬라이스 정보에 연계된 네트워크

슬라이스 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 해당 네트워크 슬라이스에 대한 우선순위 정보 중 하나 이상의 정보를 포함할 수 있다. 여기서 단말에 구성된 네트워크 슬라이스 정보는 네트워크에 의해서 단말에 구성된 슬라이스 정보 또는 가입정보를 기반으로 네트워크에 의해서 허용되는 슬라이스 정보를 의미한다.

[93] 단말은 타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 기지국으로부터 수신하는 단계를 수행할 수 있다(S430). 전술한 바와 같이, 코어망 개체는 네트워크 슬라이스 요청 정보 및 가입정보에 기초하여 확인한 정보를 포함할 수 있다.

[94] 단말의 핸드오버 경우, 코어망 개체는 확인된 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송할 수 있다. 타켓 기지국은 특정 네트워크 슬라이스 정보를 수신하면, 특정 네트워크 슬라이스 정보 및 타켓 기지국이 허용하는 네트워크 슬라이스 정보 중 적어도 하나에 기초하여 해당 단말의 핸드오버 명령을 생성할 수 있다. 타켓 기지국은 생성된 핸드오버 명령을 기지국으로 전달하고, 기지국은 핸드오버 명령을 단말로 전송할 수 있다.

[95] 이와 같은 과정을 통해서 단말은 네트워크 슬라이스를 통해서 처리하는 서비스의 연속성을 유지하면서 핸드오버를 수행할 수 있다.

[96] 이상에서 설명한 바와 같이, 단말과 기지국 및 코어망 개체는 네트워크 슬라이스를 통한 서비스를 구축하고, 네트워크 슬라이스 서비스의 연속성을 유지하면서 단말의 이동성을 제공하도록 할 수 있다.

[97] 이하에서는 RRC 연결 단말의 이동성을 유지하기 위한 보다 세부적인 실시예를 나누어 설명한다. 이하에서 설명하는 각 실시예는 독립적으로 또는 상호 조합되어 수행될 수 있으며, 도 2 내지 도 4를 참조하여 설명한 내용과는 또 다른 실시예를 포함할 수 있다. 또한, 도 2 내지 도 4를 참조하여 설명한 기지국 및 단말은 이하에서 설명하는 각 실시예도 수행할 수 있다.

[98] 제 1 실시예: 네트워크 슬라이스 정보를 포함하는 단말 지시 정보 전달

[99] RRC Connected 단말의 경우, 네트워크 슬라이스를 지원하는 셀(또는 해당 단말에 구성된 특정 네트워크 슬라이스를 지원하는 셀)로 핸드오버 시키는 것이 네트워크 측면에서 효율적일 수 있다.

[100] 또한 RRC IDLE 단말 또는 RRC INACTIVE 단말의 경우 단말의 RRC 연결 설정에 기지국이 해당 단말에 특정 네트워크 슬라이스가 구성된 것을 아는 것이 이후 단말 이동에 따라 해당 단말이 해당 네트워크 슬라이스 기반으로 서비스를 연속적으로 제공받을 수 있는 셀/네트워크를 선택 하는데 도움이 될 수 있다.

[101] 일 예로 서빙 셀에서(또는 현재 셀에서 또는 PCell에서, 이하에서 서빙 셀로 표기) 시스템 정보를 통해 슬라이스 정보를 제공하고 단말이 서빙 셀에서 시스템 정보를 통해 네트워크 슬라이스 정보를 수신하면 또는 단말에 특정 네트워크 슬라이스가 사전 구성되면 또는 네트워크를 통해 단말에 특정 네트워크 슬라이스가 구성되면, 단말은 이에 대한 요청 정보(네트워크 슬라이스 요청

정보)를 기지국으로 지시할 수 있다.

[102] 전술한 네트워크 슬라이스 요청 정보는 단말에 구성된 하나의 슬라이스 정보(Configured single slice information) 또는 하나 이상의 슬라이스 정보(Configured a collection of single slice information)를 나타낸다. 이는 네트워크에 의해 단말에 구성된 슬라이스 정보 또는 가입정보를 기반으로 네트워크에 의해 허용되는 슬라이스 정보를 나타낸다. 이하에서 네트워크 슬라이스에 대한 요청 정보는 동일한 의미로 사용될 수 있다. 다른 예로 RRC IDLE 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정(establishment)에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경 중 하나 이상의 경우에 기지국으로 구성된 네트워크 슬라이스 요청 정보를 지시하는 프로시져를 개시할 수 있다. 예를 들어 이전 네트워크 등록 프로시져를 통해 PDU 세션을 설정할 때 구성되는 네트워크 슬라이스 정보를 수신한 단말은 이후 RRC 연결 설정에 기지국으로 해당 네트워크 슬라이스 요청 정보를 지시하는 프로시져를 개시할 수 있다.

[103] 다른 예로 RRC INACTIVE 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정(establishment)에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경 중 하나 이상의 경우에 기지국으로 네트워크 슬라이스 요청 정보를 지시하는 프로시져를 개시할 수 있다. 여기서 RRC INACTIVE 상태는 NR에서 코어망 연결 기반의 새로운 상태를 나타낸다. 새로운 상태는 다음과 같은 특성을 만족할 수 있다.

[104] While the UE is in the new state, the attributes of UE, RAN and CN are characterised as follows:

[105] - The connection between CN and RAN is maintained in terms of both control and user planes.

[106] - The UE is reachable by a RAN initiated notification procedure for which the relevant parameters are configured by RAN itself.

[107] - RAN is tracking the UE location on the level of a "RAN-based notification area" and is aware whenever the UE moves from one "RAN-based notification area" to another.

[108] 다른 예로 RRC CONNECTED 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정(establishment)에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경, 이동성 제어정보를 포함하는 RRC 연결 재구성 메시지를 수신하여 타겟 기지국으로 RRC 연결 재구성 확인 메시지를 보낸 후 중 하나 이상의 경우에 기지국으로 네트워크 슬라이스 요청 정보를 지시하는 프로시져를 개시할 수 있다.

[109] 네트워크 슬라이싱은 같은 주파수를 사용하는 셀/기지국이라도 독립적으로 동작할 수 있다. 그리고/또는 네트워크 슬라이싱 영역이 주파수에 관계없이 구성될 수도 있다.

[110] 단말은 전술한 네트워크 슬라이스 요청 정보에 단말에 구성된 하나의 슬라이스 정보 또는 하나 이상의 슬라이스 정보가 포함되도록 할 수 있다. 또는 단말은 전술한 네트워크 슬라이스 요청 정보에 시스템 정보를 통해 수신된 또는 단말에 사전 구성된 또는 RRC 연결 재구성 메시지를 통해 수신된 해당 네트워크 슬라이스 정보, 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 해당 네트워크 슬라이스에 대한 우선순위 정보 중 적어도 하나의 정보를 포함할 수 있다.

[111] 전술한 네트워크 슬라이스 요청 정보는 UE assistance 메시지, RRC 연결 설정 요청 메시지, RRC 연결 셋업 완료 메시지 중 하나 이상의 RRC 메시지에 새로운 필드를 포함하여 전송되거나 새롭게 규정되는 신규 RRC 메시지를 통해 전송될 수 있다. 또는 전술한 네트워크 슬라이스 요청 정보는 NAS 메시지에 포함되어 RRC 연결 셋업 완료 메시지를 통해 기지국으로 전송될 수 있다.

[112] 기지국은 단말들로부터 수신된 전술한 네트워크 슬라이스 요청 정보를 기반으로 네트워크 슬라이싱을 통한 데이터 송수신을 제어할 수 있다. 일 예를 들어 이를 개시하거나 종료할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스 정보를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이싱에 연계된 베어러를 단말에 지시할 수 있다.

[113] 제 2 실시예: 코어망 개체를 통해 기지국으로 네트워크 슬라이스 요청 정보 전달

[114] RRC Connected 단말의 경우 네트워크 슬라이싱을 지원하는 셀(또는 해당

단말에 구성된 특정 네트워크 슬라이싱을 지원하는 셀)로 핸드오버 시키는 것이 네트워크 측면에서 효율적일 수 있다.

[115] 또한 RRC IDLE 단말 또는 RRC INACTIVE 단말의 경우 기지국이 해당 단말이 특정 네트워크 슬라이스가 구성되어 있음을 아는 것이 이후 단말 이동에 따라 해당 단말이 해당 네트워크 슬라이스 기반으로 서비스를 연속적으로 제공받을 수 있도록 하는데 도움이 될 수 있다.

[116] 일 예로 서빙 셀에서(또는 현재 셀에서 또는 PCell에서, 이하에서 서빙 셀로 표기) 시스템 정보를 통해 슬라이스 정보를 제공하고 단말이 서빙 셀에서 시스템 정보를 통해 네트워크 슬라이스 정보를 수신하면 및/또는 단말에 특정 네트워크 슬라이스가 사전 구성되면 및/또는 네트워크를 통해 단말에 네트워크 슬라이스가 구성되면, 단말은 이에 대한 네트워크 슬라이스 요청 정보를 코어망 개체(예를 들어, 5G 코어망 개체인 AMF(Access and Mobility Management Function))를 통해 기지국으로 지시할 수 있다.

[117] 다른 예로 RRC IDLE 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경, 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 경우에 코어망 개체로 네트워크 슬라이스 요청 정보를 전송할 수 있다.

[118] 다른 예로 RRC INACTIVE 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경, 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 경우에 코어망 개체로 네트워크 슬라이스 요청 정보를 전송할 수 있다.

[119] 다른 예로 RRC CONNECTED 상태에 있는, 네트워크 슬라이스가 구성된 단말 또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는

네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정에, 또는 현재 네트워크 슬라이스를 지원하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스 변경, 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 경우에 코어망 개체로 네트워크 슬라이스 정보를 전송할 수 있다.

[120] 코어망 개체(예를 들어, 5G 코어망 개체인 AMF)는 단말 컨택스트를 셋업하기 위한 프로시져를 통해 기지국에 특정 네트워크 슬라이스 정보를 전송할 수 있다.

[121] 네트워크 슬라이싱은 같은 주파수를 사용하는 셀/기지국이라도 독립적으로 동작할 수 있다. 그리고/또는 네트워크 슬라이싱 영역(area)이 주파수에 관계없이 구성될 수도 있다. 예를 들어 특정 네트워크 슬라이스가 네트워크 일부 셀/기지국/영역에서 구성될 수 있고 다른 셀/기지국/영역에서는 제공되지 않을 수 있다. 해당 네트워크 슬라이스 영역은 단말이 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 적어도 하나를 수행할 때, 코어망 개체(예를 들어 5G 코어망 개체인 AMF)가 할당하는 등록 영역 또는 트래킹 영역 또는 한 셋의 셀들 중 하나가 될 수 있다. 또는 단말이 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 적어도 하나를 수행할 때 기지국이 할당하는 RAN Notification 영역 또는 한 셋의 셀들 중 하나가 될 수 있다.

[122] 단말은 전술한 코어망 개체로 전송하는 네트워크 슬라이스 요청 정보에 단말에 구성된 특정 슬라이스에 대한 정보를 포함하도록 할 수 있다. 또는 단말은 전술한 네트워크 슬라이스 요청 정보에 시스템정보를 통해 수신된 또는 단말에 사전 구성된 또는 RRC 연결 재구성 메시지를 통해 수신된 해당 네트워크 슬라이스 정보, 해당 네트워크 슬라이스 정보에 연계된 네트워크 슬라이스 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 해당 네트워크 슬라이스에 대한 우선순위 정보 중 하나 이상의 정보를 포함할 수 있다. 네트워크 슬라이스 요청 정보에 포함되는 사전 구성된 슬라이스 정보는 네트워크에 의해 단말에 구성된 슬라이스 정보 또는 가입정보를 기반으로 네트워크에 의해 허용되는 슬라이스 정보를 나타낸다.

[123] 기지국은 단말로부터 코어망 개체를 통해 수신된 전술한 네트워크 슬라이스 요청 정보를 기반으로 네트워크 슬라이싱을 통한 데이터 송수신을 제어할 수 있다. 코어망 개체는 단말이 해당 네트워크 슬라이스에 액세스할 권한을 가지고 있는 지에 대한 유효성을 검증할 수 있다. 따라서 기지국은 코어망 개체를 통해

수신된 전술한 네트워크 슬라이스 요청 정보를 기반으로 네트워크 슬라이싱을 통한 데이터 송수신을 제어할 수 있다. 일 예를 들어 이를 개시하거나 종료할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스 정보를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스에 연계된 PDU 세션의 베어러를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 해당 네트워크 슬라이스를 기반으로 데이터를 처리할 수 있다. 다른 예를 들어 기지국은 해당 네트워크 슬라이스의 RAN 부분을 선택하여 해당 네트워크 슬라이스에 대한 차별화된 데이터 처리를 수행할 수 있다.

[124] 제 3 실시예: 핸드오버 동안 슬라이스 정보를 타겟 기지국으로 전달

[125]

[126] *RRC Connected 상태의 단말이 특정 네트워크 슬라이스를 통해 데이터를 송수신중인 동안 단말 이동에 따라 핸드오버가 수행될 수 있다. 전술한 바와 같이 이웃 셀에서 해당 슬라이스를 지원하는 것을 인지하는 것은 5G셀/기지국/네트워크가 단말을 핸드오버 시킬 때 도움이 될 수 있다.

[127] 제 1 및 제 2 실시예에서 설명한 바와 같이 기지국은 단말 또는 5G 코어망 개체에 의해 제공되는 도움 정보(예를 들어, 네트워크 슬라이스 요청 정보)에 의해 RRC Connected 상태 단말에 구성된 및/또는 네트워크에서 허용된 네트워크 슬라이스 정보를 인지하고 있다.

[128] 핸드오버 준비 동안 소스 기지국은, 만약 가용한 경우, 단말로부터 수신한 네트워크 슬라이스 요청 정보를 타겟 기지국으로 전달할 수 있다. 또는 핸드오버 준비 동안 소스 기지국은, 만약 가용한 경우, 코어망 개체로부터 수신한 네트워크 슬라이스 요청 정보를 타겟 기지국으로 전달할 수 있다. 또는 핸드오버 준비 동안 소스 기지국은, 만약 가용한 경우, 단말 또는 코어망 개체로부터 수신한 네트워크 슬라이스 요청 정보를 코어망 개체를 통해 타겟 기지국으로 전달할 수 있다. 여기서, 전달되는 네트워크 슬라이스 요청 정보는 코어망 개체가 가입 정보를 기반으로 확인한 특정 네트워크 슬라이스 정보를 의미할 수 있다.

[129] 다른 예로 핸드오버 이후 단말이 네트워크 슬라이스 정보를 업데이트하기 전에 단말은 네트워크 슬라이스 관련 시스템 정보(또는 네트워크 슬라이싱 관련 최소 시스템 정보에 연계된 온디맨드 시스템 정보 또는 네트워크 슬라이싱 여부를 확인할 수 있는 제어정보)를 읽을 수 있다.

[130] 다른 예로 만약 소스 셀에서 네트워크 슬라이스 관련 시스템 정보(또는 네트워크 슬라이싱 관련 최소 시스템 정보에 연계된 온디맨드 시스템 정보 또는 네트워크 슬라이싱 여부를 확인할 수 있는 제어정보)가 제공되지 않았거나, 또는 네트워크 슬라이싱을 통한 수신을 수행하지 않았던 단말이 핸드오버를 하는 경우, 핸드 오버 이후 단말은 전술한 구성된 네트워크 슬라이스 정보를 기지국으로 지시할 수 있다.

[131] 일 예로, 전술한 구성된 네트워크 슬라이스 정보는 Handover 요청 메시지에

포함되어 전송될 수 있다. 또는, 전술한 구성된 네트워크 슬라이스 정보는 HandoverPreparation 메시지에 포함되어 전송될 수 있다. 또는, 전술한 구성된 네트워크 슬라이스 정보는 HandoverPreparation 메시지의 AS-Context 정보에 포함되어 전송될 수 있다. 또는, 타겟 셀/기지국은 핸드오버 응답 기지국간 인터페이스(Xn) 메시지 또는 handoverCommand Inter-node RRC 메시지에 네트워크 슬라이스 정보가 포함될 수 있다. 예를 들어 타겟 셀/기지국에 의해 지원/허용된 네트워크 슬라이스 정보를 포함할 수 있다.

[132] 다른 예로 타겟 셀/기지국이 해당 네트워크 슬라이스를 지원/허용하지 않는 경우, 타겟 기지국은 핸드오버 응답 기지국간 인터페이스(Xn) 메시지 또는 handoverCommand Inter-node RRC 메시지에 이를 지시하기 위한 정보를 포함할 수 있다. 예를 들어 타겟 셀/기지국에 의해 지원/허용되지 않는 실패된 네트워크 슬라이스 정보를 포함할 수 있다.

[133] 일 예를 들어 만약 타겟 셀/기지국이 소스 셀/기지국을 통해 전술한 구성된 네트워크 슬라이스 정보를 수신했을 때, 타겟 셀/기지국이 네트워크 슬라이싱을 지원/허용하지 않거나 또는 네트워크 슬라이싱을 통해 해당 구성된 네트워크 슬라이스를 제공하지 않는 경우 또는 소스 셀과 타겟 셀이 서로 다른 네트워크 슬라이스 영역에 포함되는 경우, 타겟 기지국은 핸드오버 응답 기지국간 인터페이스(Xn) 메시지에 소스 기지국을 통해 수신한 네트워크 슬라이스를 지원/허용하지 않음을 지시하기 위한 정보를 포함하여 소스 기지국으로 전달할 수 있다. 다른 예를 들어 만약 타겟 셀/기지국이 소스 셀/기지국을 통해 전술한 정보를 수신했을 때, 타겟 셀/기지국이 네트워크 슬라이싱을 지원/허용하지 않거나 또는 네트워크 슬라이싱을 통해 해당 구성된 네트워크 슬라이스를 제공하지 않는 경우 handoverCommand Inter-node RRC 메시지에 이를 지시하기 위한 정보를 포함하여 단말로 전달할 수 있다. 다른 예로 소스 기지국은 상기한 타겟 기지국으로 핸드오버를 결정하지 않을 수 있다.

[134] 다른 예로 핸드오버 준비 동안 소스 기지국은, 만약 가용한 경우, 단말 또는 코어망 개체로부터 수신한 네트워크 슬라이스 정보를 코어망 개체를 통해 타겟 기지국으로 전달할 수 있다. 종래 기술에서 코어망 개체와 기지국간 인터페이스 기반의 핸드오버는 기지국 간 인터페이스 기반 핸드오버가 사용될 수 없을 때 사용된다. 예를 들어 종래 LTE 기술에서 코어망 개체와 기지국간 인터페이스(S1) 기반의 핸드오버는 기지국 간 인터페이스(X2) 기반 핸드오버가 사용될 수 없을 때 사용된다. 5G망에서도 종래 기술과 같이 코어망 개체와 기지국간 인터페이스 기반의 핸드오버는 기지국 간 인터페이스 기반 핸드오버가 사용될 수 없을 때 사용될 수 있다. 예를 들어 소스 기지국과 타겟 기지국 간에 직접 인터페이스가 존재하지 않거나 소스 셀과 타겟 셀이 서로 다른 네트워크 영역에 포함될 때 사용될 수 있다. 이와 같이 만약 소스 기지국과 타겟 기지국 간에 직접 인터페이스가 존재하지 않거나 또는 소스 셀과 타겟 셀이 서로 다른 네트워크 슬라이스 영역에 포함된다면, 소스 기지국은 단말 또는 코어망

개체로부터 수신한 네트워크 슬라이스 정보를 코어망 개체를 통해 타겟 기지국으로 전달할 수 있다.

[135] 제 4 실시예: RRC 연결 재구성 확인 메시지를 통해 타겟 기지국으로 네트워크 슬라이스 정보를 기지국으로 전송

[136] 일 예로 단말은 소스 기지국을 통해 이동성 제어정보를 포함하는 RRC 연결 재구성 메시지를 수신할 수 있다. 다른 예로 단말은 타겟 기지국에 의해 생성된 이동성 제어정보를 포함하는 RRC 연결 재구성 메시지를 소스 기지국을 통해 수신할 수 있다. 단말은 RRC 연결 재구성 확인 메시지에 전술한 네트워크 슬라이스 정보(네트워크 슬라이스 관련 정보 또는 구성된 네트워크 슬라이스 정보)를 포함할 수 있다. 네트워크 슬라이스 관련 정보는 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 또는 네트워크 슬라이스에 연계된 PDU 세션의 베어러 정보 중 하나 이상을 포함할 수 있다. 이를 수신한 단말은 코어망 개체로 네트워크 슬라이스 정보를 확인하기 위한 프로시져를 개시할 수 있다. 이를 위해 단말은 전술한 네트워크 슬라이스 정보를 포함한 NAS 메시지를 기지국으로 전송할 수 있다.

[137] 기지국은 단말들로부터 수신된 전술한 정보를 기반으로 네트워크 슬라이싱을 통한 데이터 송수신을 제어할 수 있다. 일 예를 들어 이를 개시하거나 종료할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스 정보를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 구성된 네트워크 슬라이스에 연계된 베어러를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스를 기반으로 데이터를 처리할 수 있다.

[138] 제 5 실시예: 핸드오버 과정에서 코어망 개체로부터 코어망과 기지국간 인터페이스를 통해 슬라이스 정보를 수신하는 방법

[139] 기지국은 RRC Connected 상태 단말의 기지국간 핸드오버 과정에서 코어망 개체로부터 코어망과 기지국간 인터페이스를 통해 슬라이스 정보를 수신할 수 있다. 일 예로 코어망 개체는 타겟 기지국으로부터 특정 네트워크 슬라이스 정보를 포함한 경로 변경 요청 메시지(예를 들어 Path switch 요청 메시지)를 수신하면 경로 변경 요청 확인 메시지 상에 전술한 특정 네트워크 슬라이스 정보를 포함하여 전송할 수 있다. 기지국은 코어망 개체로부터 수신된 전술한 정보를 기반으로 해당 네트워크 슬라이스를 통한 데이터 송수신을 제어할 수 있다. 일 예를 들어 이를 개시하거나 종료할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스 정보를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 네트워크 슬라이스에 연계된 서비스/PDU 세션/베어러를 단말에 지시할 수 있다. 다른 예를 들어 기지국은 해당 네트워크 슬라이스를 기반으로 데이터를 처리할 수 있다.

[140] 다른 예를 들어 코어망 개체는 RRC Connected 상태 단말의 핸드오버 과정에서 네트워크 슬라이스에 관한 단말 컨택스트를 셋업/구성하기 위해 기지국에 특정 네트워크 슬라이스 정보를 전송할 수 있다. 네트워크 슬라이스가 구성된 단말

또는 특정 네트워크 슬라이스를 통한 데이터 송수신이 구성된 단말 또는 네트워크 슬라이싱 가능 단말 또는 네트워크 슬라이싱을 통해 특정 네트워크 슬라이스 기반으로 데이터 통신을 수행하고자 하는 단말은 RRC Connection 설정에, 또는 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경, 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 경우에 코어망 개체로 네트워크 슬라이스 요청 정보를 전송할 수 있다. 또는 단말 또는 코어망 개체로부터 네트워크 슬라이스 정보를 수신한 기지국, 또는 네트워크 슬라이스 정보를 단말에 지시한 기지국, 또는 네트워크 슬라이스에 연계된 서비스/PDU 세션/베어러를 단말에 지시한 기지국 또는 해당 네트워크 슬라이스를 기반으로 데이터를 처리하는 기지국은 현재 네트워크 슬라이스를 지원/허용하는 셀/네트워크에 들어갈 때 또는 나갈 때, 또는 PDU 세션의 시작 또는 종료에, 또는 네트워크 슬라이싱 관련 시스템 정보 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스의 변경 또는 네트워크 슬라이싱을 통해 수신하고자 하는 구성된 네트워크 슬라이스 서비스의 변경, 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 경우에 코어망 개체로 네트워크 슬라이스 요청 정보를 전송할 수 있다. 네트워크 슬라이스 요청 정보는 네트워크 슬라이스 관련 정보 또는 구성된 네트워크 슬라이스 정보를 포함할 수 있다. 네트워크 슬라이스 관련 정보는 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 또는 네트워크 슬라이스에 연계된 PDU 세션의 베어러 정보 중 하나가 될 수 있다.

[141] 코어망 개체는 해당 네트워크 슬라이스에 대한 단말 컨텍스트를 셋업하기 위해 기지국에 특정 네트워크 슬라이스 정보를 전송할 수 있다. 이를 위해 코어망 개체는 가입자정보 서버 등을 통한 가입정보(subscription data) 등에 포함된 값에 따라 특정 구성된 네트워크 슬라이스 정보를 포함하는 단말 컨텍스트 정보를 기지국으로 지시할 수 있다. 코어망 개체가 전송하는 단말 컨텍스트 정보는 네트워크 슬라이스 관련 정보 또는 구성된 네트워크 슬라이스 정보를 포함할 수 있다. 네트워크 슬라이스 관련 정보는 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 또는 네트워크 슬라이스에 연계된 PDU 세션의 베어러 정보 중 하나가 될 수 있다.

[142] 다른 예로 핸드오버 준비 동안 소스 기지국은, 만약 가용한 경우, 단말 또는 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보를 코어망 개체를 통해 타겟 기지국으로 전달할 수 있다. 소스 기지국으로부터 수신한 특정 네트워크

슬라이스 정보를 수신한 코어망 개체는 해당 네트워크 슬라이스에 대한 단말 컨텍스트를 셋업하기 위해 타겟 기지국에 특정 네트워크 슬라이스 정보를 전송할 수 있다.

[143] 제 6 실시예: 핸드오버 완료 이후 단말이 네트워크 슬라이스 정보를 기지국으로 전송하는 방법

[144] 일 예로 RRC Connected 상태 단말의 핸드오버 과정에서 소스 기지국은, 만약 가용한 경우, 단말 또는 코어망 개체로부터 수신한 네트워크 슬라이스 정보를 코어망 개체를 통해 타겟 기지국으로 전달할 수 있다. 타겟 기지국으로부터 생성된 핸드오버 명령(handover command)을 소스 기지국을 통해 수신한 단말은 핸드오버를 실행한다. 핸드오버 명령은 전술한 네트워크 슬라이스 정보(네트워크 슬라이스 관련 정보 또는 구성된 네트워크 슬라이스 정보)를 포함할 수 있다. 네트워크 슬라이스 관련 정보는 해당 네트워크 슬라이스 정보에 연계된 서비스/PDU 세션/베어러를 식별하기 위한 정보 또는 네트워크 슬라이스에 연계된 PDU 세션의 베어러 정보 중 하나를 포함할 수 있다. 이를 수신한 단말은 코어망 개체로 네트워크 슬라이스 정보를 확인하기 위한 프로시져를 개시할 수 있다. 전술한 코어망 개체로 네트워크 슬라이스 정보를 확인하기 위한 프로시져는 네트워크 등록(attach), 트래킹 영역 업데이트, 서비스 요청, 네트워크 연결 설정(registration/PDU session establishment) 중 하나 이상의 프로시져가 될 수 있다.

[145] 이상에서 설명한 동작을 통해서 단말은 이동 상황에서도 네트워크 슬라이스를 통해서 서비스를 지속적으로 활용할 수 있다.

[146] 이하에서는 위에서 설명한 각 실시예의 전부 또는 일부를 수행할 수 있는 기지국 및 단말 구성을 도면을 참조하여 다시 한 번 설명한다.

[147] 도 5는 또 다른 실시예에 따른 기지국 구성을 설명하기 위한 도면이다.

[148] 도 5를 참조하면, 기지국(500)은 네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 수신부(530) 및 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 제어부(510)를 포함할 수 있다.

[149]

[150] *또한, 수신부(530)는 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 더 수신할 수 있다. 수신부(530)는 RRC(Radio Resource Control) 연결 셋업 메시지를 통해서 네트워크 슬라이스 요청 정보를 수신할 수 있다.

[151] 네트워크 슬라이스 요청 정보는 단말에 구성된 특정 네트워크 슬라이스 정보를 포함할 수 있다. 예를 들어, 네트워크 슬라이스 요청 정보는 단말에 구성된 네트워크 슬라이스 정보, 해당 네트워크 슬라이스 정보에 연계된 네트워크 슬라이스 서비스/PDU 세션/베어러를 식별하기 위한 정보 및 해당 네트워크 슬라이스에 대한 우선순위 정보 중 하나 이상의 정보를 포함할 수 있다. 여기서 단말에 구성된 네트워크 슬라이스 정보는 네트워크에 의해서 단말에 구성된

슬라이스 정보 또는 가입정보를 기반으로 네트워크에 의해서 허용되는 슬라이스 정보를 의미할 수 있다.

[152] 기지국(500)은 네트워크 슬라이스 요청 정보를 코어망 개체로 전송하는 송신부(520)를 더 포함할 수 있다. 송신부(520)는 타켓 기지국으로 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송할 수 있다. 타켓 기지국으로 전송되는 특정 네트워크 슬라이스 정보는 코어망 개체를 통해서 전송될 수 있다.

[153] 한편, 제어부(510)는 전술한 단말 또는 코어망 개체로부터 네트워크 슬라이스 정보를 수신하여, 네트워크 슬라이스 서비스를 제어하고, 단말의 이동성을 제어하는 데에 따른 전반적인 기지국(500) 동작을 제어할 수 있다.

[154] 이 외에도, 송신부(520)와 수신부(530)는 전술한 본 실시예들을 수행하기에 필요한 신호나 메시지, 데이터를 단말, 타켓 기지국 및 코어망 개체와 송수신하는데 사용된다.

[155] 도 6은 또 다른 실시예에 따른 단말 구성을 설명하기 위한 도면이다.

[156] 도 6을 참조하면, 단말(600)은 네트워크 슬라이스를 구성하는 제어부(620)와 네트워크 슬라이스 요청 정보를 기지국으로 전송하는 송신부(630) 및 타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 기지국으로부터 수신하는 수신부(610)를 포함할 수 있다.

[157] 제어부(620)는 하나 또는 복수의 네트워크 슬라이스를 구성하며, 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되도록 구성할 수 있다.

[158] 송신부(630)는 RRC(Radio Resource Control) 연결 셋업 메시지 또는 상기 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지를 통해서 네트워크 슬라이스 요청 정보를 전송할 수 있다.

[159] 한편, 제어부(620)는 전술한 기지국 또는 코어망 개체를 통해서 네트워크 슬라이스를 구성하고, 이동 상황에서도 네트워크 슬라이스를 통한 서비스의 연속성을 유지하는 데에 따른 전반적인 단말(600) 동작을 제어할 수 있다.

[160] 이 외에도, 송신부(630)와 수신부(610)는 전술한 본 실시예들을 수행하기에 필요한 신호나 메시지, 데이터를 기지국, 타켓 기지국 및 코어망 개체와 송수신하는데 사용된다.

[161] 전술한 실시예에서 언급한 표준내용 또는 표준문서들은 명세서의 설명을 간략하게 하기 위해 생략한 것으로 본 명세서의 일부를 구성한다. 따라서, 위 표준내용 및 표준문서들의 일부의 내용을 본 명세서에 추가하거나 청구범위에 기재하는 것은 본 발명의 범위에 해당하는 것으로 해석되어야 한다.

[162] 이상의 설명은 본 발명의 기술 사상을 예시적으로 설명한 것에 불과한 것으로서, 본 발명이 속하는 기술 분야에서 통상의 지식을 가진 자라면 본 발명의 본질적인 특성에서 벗어나지 않는 범위에서 다양한 수정 및 변형이 가능할 것이다. 따라서, 본 발명에 개시된 실시예들은 본 발명의 기술 사상을

한정하기 위한 것이 아니라 설명하기 위한 것이고, 이러한 실시예에 의하여 본 발명의 기술사상의 범위가 한정되는 것은 아니다. 본 발명의 보호 범위는 아래의 청구범위에 의하여 해석되어야 하며, 그와 동등한 범위 내에 있는 모든 기술 사상은 본 발명의 권리범위에 포함되는 것으로 해석되어야 할 것이다.

[163]

[164] **CROSS-REFERENCE TO RELATED APPLICATION**

[165] 본 특허출원은 2016년 11월 03일 한국에 출원한 특허출원번호 제 10-2016-0146054 호 및 2017년 10월 30일 한국에 출원한 특허출원번호 제 10-2017-0142205 호에 대해 미국 특허법 119(a)조 (35 U.S.C § 119(a))에 따라 우선권을 주장하며, 그 모든 내용은 참고문헌으로 본 특허출원에 병합된다. 아울러, 본 특허출원은 미국 이외에 국가에 대해서도 위와 동일한 이유로 우선권을 주장하면 그 모든 내용은 참고문헌으로 본 특허출원에 병합된다.

청구범위

[청구항 1] 기지국이 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 방법에 있어서,
네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 단계;
상기 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 단계; 및
상기 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 상기 코어망 개체로부터 수신하는 단계를 포함하는 방법.

[청구항 2] 제 1 항에 있어서,
상기 단말은,
하나 또는 복수의 네트워크 슬라이스를 구성하며, 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되는 것을 특징으로 하는 방법.

[청구항 3] 제 1 항에 있어서,
상기 네트워크 슬라이스 요청 정보는,
RRC(Radio Resource Control) 연결 셋업 메시지 또는 상기 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함되는 것을 특징으로 하는 방법.

[청구항 4] 제 1 항에 있어서,
상기 특정 네트워크 슬라이스 정보는,
상기 코어망 개체가 상기 네트워크 슬라이스 요청 정보 및 가입정보에 기초하여 특정된 것으로, 단말 컨텍스트 정보에 포함되어 수신되는 것을 특징으로 하는 방법.

[청구항 5] 제 1 항에 있어서,
상기 특정 네트워크 슬라이스 정보를 상기 코어망 개체로부터 수신한 이후,
상기 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송하는 단계를 더 포함하는 것을 특징으로 하는 방법.

[청구항 6] 제 5 항에 있어서,
상기 타켓 기지국으로 전송하는 단계는,
상기 코어망 개체를 통해서 이루어지는 것을 특징으로 하는 방법.

[청구항 7] 단말이 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 방법에 있어서,
네트워크 슬라이스를 구성하는 단계;
네트워크 슬라이스 요청 정보를 기지국으로 전송하는 단계; 및

타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 상기 기지국으로부터 수신하는 단계를 포함하는 방법.

[청구항 8] 제 7 항에 있어서,
상기 네트워크 슬라이스를 구성하는 단계는,
하나 또는 복수의 네트워크 슬라이스를 구성하며, 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되도록 구성하는 것을 특징으로 하는 방법.

[청구항 9] 제 7 항에 있어서,
상기 네트워크 슬라이스 요청 정보는,
RRC(Radio Resource Control) 연결 셋업 메시지 또는 상기 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함되는 것을 특징으로 하는 방법

[청구항 10] 제 7 항에 있어서,
상기 기지국은,
상기 네트워크 슬라이스 요청 정보를 상기 코어망 개체로 전달하고, 상기 코어망 개체로부터 상기 네트워크 슬라이스 요청 정보에 기초하여 구성된 상기 특정 네트워크 슬라이스 정보를 수신하는 것을 특징으로 하는 방법.

[청구항 11] 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 기지국에 있어서,
네트워크 슬라이스가 구성된 단말로부터 네트워크 슬라이스 요청 정보를 수신하는 수신부; 및
상기 네트워크 슬라이스 요청 정보를 코어망 개체로 전달하도록 제어하는 제어부를 포함하되,
상기 수신부는,
상기 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 상기 코어망 개체로부터 더 수신하는 기지국.

[청구항 12] 제 11 항에 있어서,
상기 단말은,
하나 또는 복수의 네트워크 슬라이스를 구성하며, 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되는 것을 특징으로 하는 기지국.

[청구항 13] 제 11 항에 있어서,
상기 네트워크 슬라이스 요청 정보는,
RRC(Radio Resource Control) 연결 셋업 메시지 또는 상기 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함되는 것을 특징으로 하는 기지국.

[청구항 14] 제 11 항에 있어서,

상기 특정 네트워크 슬라이스 정보는,
상기 코어망 개체가 상기 네트워크 슬라이스 요청 정보 및 가입정보에 기초하여 특정된 것으로, 단말 컨택스트 정보에 포함되어 수신되는 것을 특징으로 하는 기지국.

[청구항 15] 제 11 항에 있어서,
상기 특정 네트워크 슬라이스 정보를 상기 코어망 개체로부터 수신한 이후,
상기 특정 네트워크 슬라이스 정보를 타켓 기지국으로 전송하는 송신부를 더 포함하는 것을 특징으로 하는 기지국.

[청구항 16] 제 15 항에 있어서,
상기 송신부는,
상기 특정 네트워크 슬라이스 정보를 상기 코어망 개체를 통해서 전송하는 것을 특징으로 하는 방법.

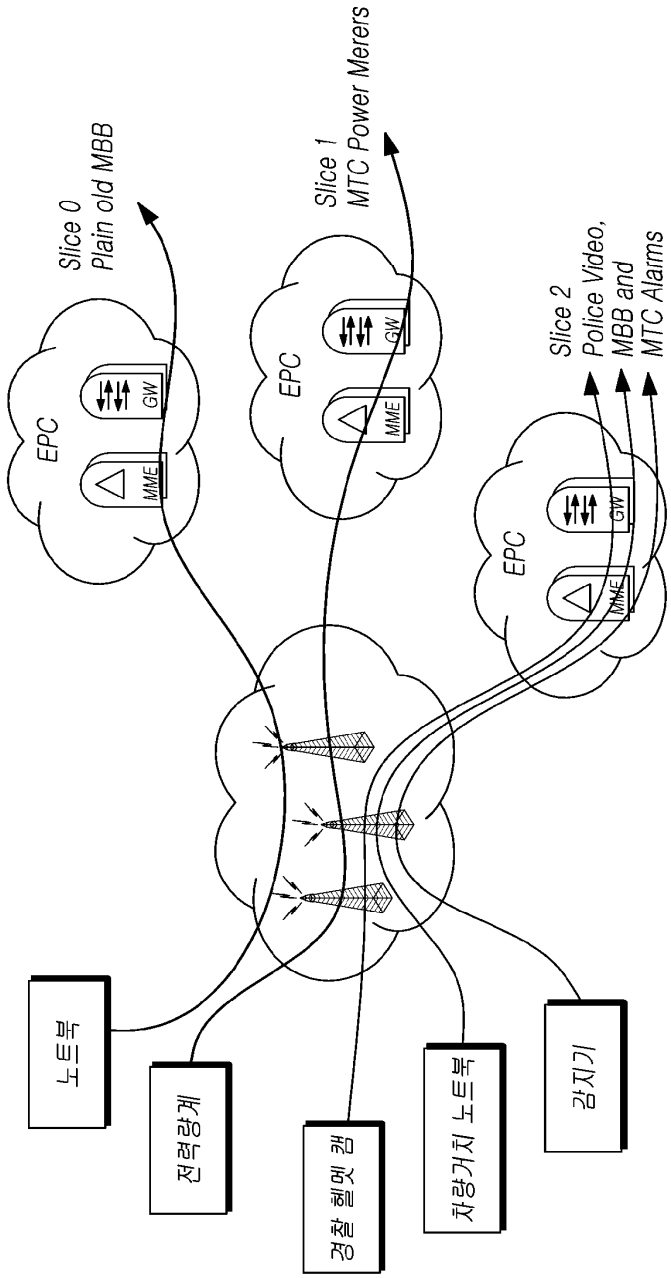
[청구항 17] 네트워크 슬라이스를 통한 데이터 송수신을 제어하는 단말에 있어서,
네트워크 슬라이스를 구성하는 제어부;
네트워크 슬라이스 요청 정보를 기지국으로 전송하는 송신부; 및
타켓 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 상기 기지국으로부터 수신하는 수신부를 포함하는 단말.

[청구항 18] 제 17 항에 있어서,
상기 제어부는,
하나 또는 복수의 네트워크 슬라이스를 구성하며, 하나의 네트워크 슬라이스는 하나의 PDU(Protocol Data Unit) 세션에 연계되도록 구성하는 것을 특징으로 하는 단말.

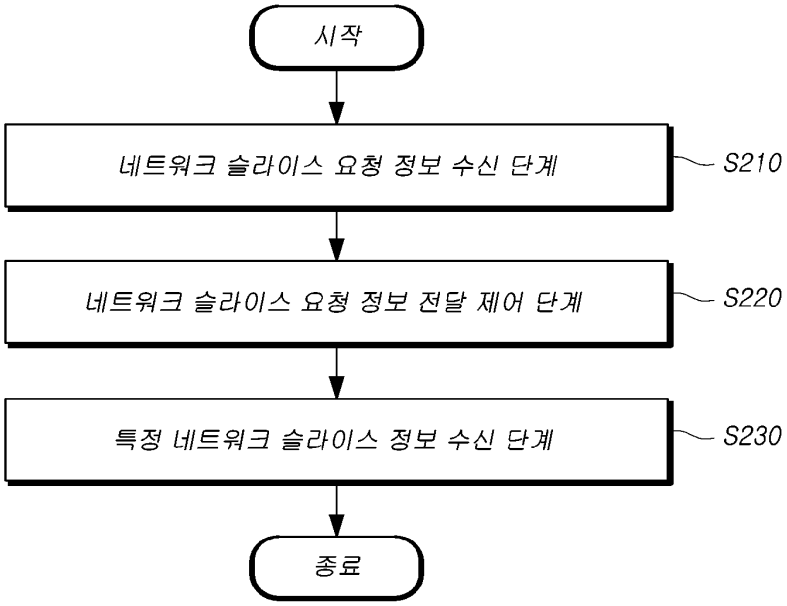
[청구항 19] 제 17 항에 있어서,
상기 네트워크 슬라이스 요청 정보는,
RRC(Radio Resource Control) 연결 셋업 메시지 또는 상기 RRC 연결 셋업 메시지에 포함되는 NAS(Non Access Stratum) 메시지에 포함되는 것을 특징으로 하는 단말.

[청구항 20] 제 17 항에 있어서,
상기 기지국은,
상기 네트워크 슬라이스 요청 정보를 상기 코어망 개체로 전달하고, 상기 코어망 개체로부터 상기 네트워크 슬라이스 요청 정보에 기초하여 구성된 상기 특정 네트워크 슬라이스 정보를 수신하는 것을 특징으로 하는 단말.

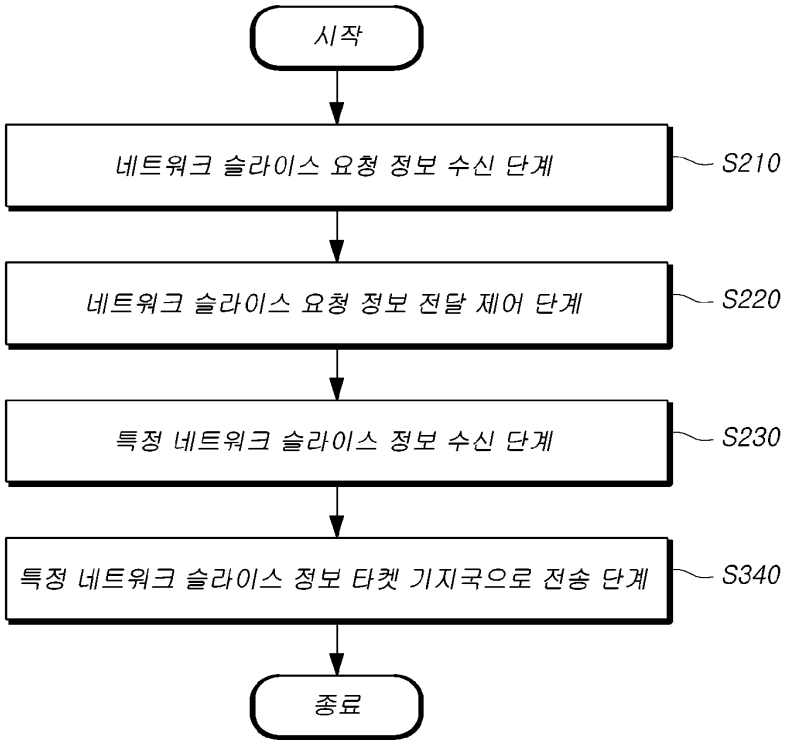
[도1]


Slice 0
Plain old MBB
Slice 1
MTC Power Merers
Slice 2
Police Video,
MBB and
MTC Alarms
EPC
MME
GW
노트북
전력량계
경찰 헬멧 캠
차량거치 노트북
감지기

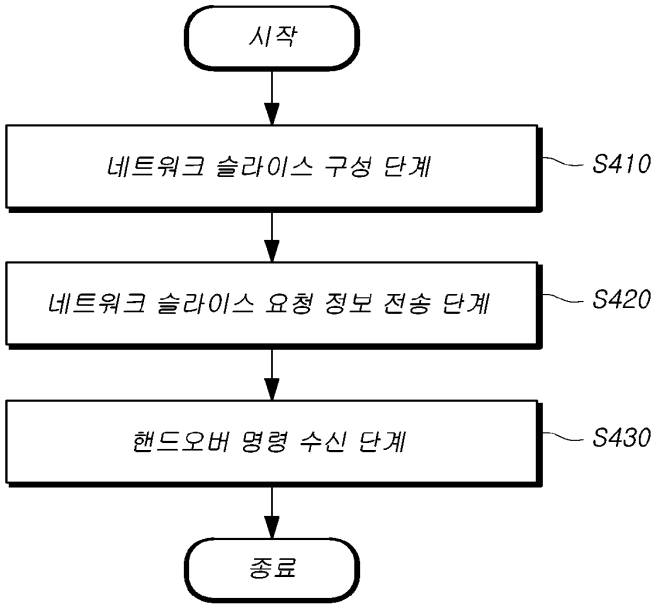
[도2]


시작
네트워크 슬라이스 요청 정보 수신 단계
S210
네트워크 슬라이스 요청 정보 전달 제어 단계
S220
특정 네트워크 슬라이스 정보 수신 단계
S230
종료

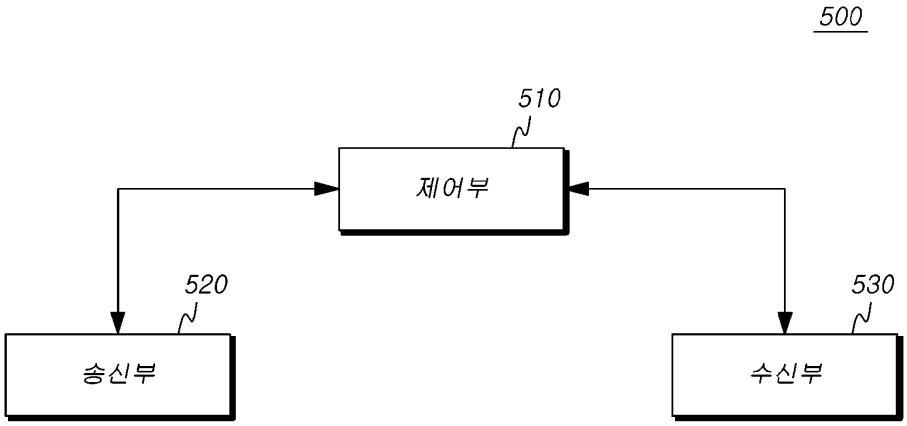
[도3]


시작
네트워크 슬라이스 요청 정보 수신 단계
S210
네트워크 슬라이스 요청 정보 전달 제어 단계
S220
특정 네트워크 슬라이스 정보 수신 단계
S230
특정 네트워크 슬라이스 정보 타켓 기지국으로 전송 단계
S340
종료

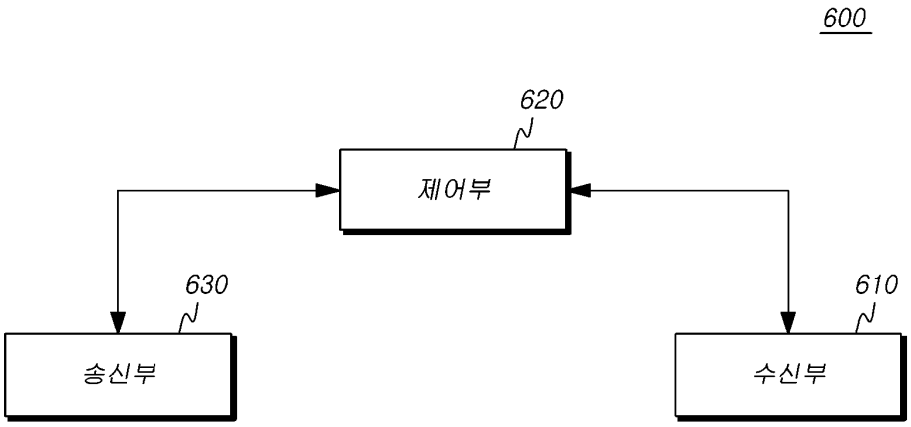
[도4]


시작
네트워크 슬라이스 구성 단계
S410
네트워크 슬라이스 요청 정보 전송 단계
S420
핸드오버 명령 수신 단계
S430
종료

[도5]


500
510
제어부
520
송신부
530
수신부

[도6]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2017/012319

A. CLASSIFICATION OF SUBJECT MATTER

H04W 28/02(2009.01)i, H04W 76/04(2009.01)i

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)
H04W 28/02; H04W 36/14; H04W 36/16; H04W 48/18; H04W 76/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Utility models and applications for Utility models: IPC as above
Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS (KIPO internal) & Keywords: network slice, handover, core

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ERICSSON, "Solution for Selection of a Network Slice Instance", S2-161480, SA WG2 Meeting #114, 05 April 2016 See section 6.1.x.2.	1,3,11,13
Y		2,4-10,12,14-20
Y	QUALCOMM INCORPORATED, "Solution for Key Issue 1 on Network Slicing: Network Slice and Network Functions Selection Based on Evolved eDECOR Model", S2-162339, SA WG2 Meeting #115, 17 May 2016 See sections 6.1.X.1, 6.1.X.2.1.	2,4,8,12,14,18
Y	WO 2016-162480 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 13 October 2016 See paragraphs [0061], [0063], [0070] and figure 7.	5-10,15-20
A	SAMSUNG, "Solution for Network Slice Selection Based on the NG UE's Service Context", S2-162622, SA WG2 Meeting #115, 17 May 2016 See section 6.2.x.2.	1-20
A	US 2014-0198768 A1 (LG ELECTRONICS INC.) 17 July 2014 See claims 1-9 and figure 6.	1-20

☐ 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
30 JANUARY 2018 (30.01.2018)	**01 FEBRUARY 2018 (01.02.2018)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. +82-42-481-8578	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2017/012319

Patent document cited in search report	Publication date	Patent family member	Publication date
WO 2016-162480 A1	13/10/2016	NONE	
US 2014-0198768 A1	17/07/2014	NONE	

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 307 of 522

국 제 조 사 보 고 서

국제출원번호
PCT/KR2017/012319

A. 발명이 속하는 기술분류(국제특허분류(IPC))

H04W 28/02(2009.01)i, H04W 76/04(2009.01)i

B. 조사된 분야

조사된 최소문헌(국제특허분류를 기재)
H04W 28/02; H04W 36/14; H04W 36/16; H04W 48/18; H04W 76/04

조사된 기술분야에 속하는 최소문헌 이외의 문헌
한국등록실용신안공보 및 한국공개실용신안공보: 조사된 최소문헌란에 기재된 IPC
일본등록실용신안공보 및 일본공개실용신안공보: 조사된 최소문헌란에 기재된 IPC

국제조사에 이용된 전산 데이터베이스(데이터베이스의 명칭 및 검색어(해당하는 경우))
eKOMPASS(특허청 내부 검색시스템) & 키워드: 네트워크 슬라이스, 핸드오버, 코어

C. 관련 문헌

카테고리*	인용문헌명 및 관련 구절(해당하는 경우)의 기재	관련 청구항
X	ERICSSON, `Solution for selection of a network slice instance', S2-161480, SA WG2 Meeting #114, 2016.04.05 섹션 6.1.x.2 참조.	1,3,11,13
Y		2,4-10,12,14-20
Y	QUALCOMM INCORPORATED, `Solution for key issue 1 on Network Slicing: Network Slice and Network Functions Selection based on evolved eDECOR model', S2-162339, SA WG2 Meeting #115, 2016.05.17 섹션 6.1.X.1, 6.1.X.2.1 참조.	2,4,8,12,14,18
Y	WO 2016-162480 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 2016.10.13 단락 [0061], [0063], [0070] 및 도면 7 참조.	5-10,15-20
A	SAMSUNG, `Solution for Network Slice Selection based on the NG UE' s service context', S2-162622, SA WG2 Meeting #115, 2016.05.17 섹션 6.2.x.2 참조.	1-20
A	US 2014-0198768 A1 (LG ELECTRONICS INC.) 2014.07.17 청구항 1-9 및 도면 6 참조.	1-20

☐ 추가 문헌이 C(계속)에 기재되어 있습니다.

☒ 대응특허에 관한 별지를 참조하십시오.

* 인용된 문헌의 특별 카테고리:

"A" 특별히 관련이 없는 것으로 보이는 일반적인 기술수준을 정의한 문헌

"E" 국제출원일보다 빠른 출원일 또는 우선일을 가지나 국제출원일 이후에 공개된 선출원 또는 특허 문헌

"L" 우선권 주장에 의문을 제기하는 문헌 또는 다른 인용문헌의 공개일 또는 다른 특별한 이유(이유를 명시)를 밝히기 위하여 인용된 문헌

"O" 구두 개시, 사용, 전시 또는 기타 수단을 언급하고 있는 문헌

"P" 우선일 이후에 공개되었으나 국제출원일 이전에 공개된 문헌

"T" 국제출원일 또는 우선일 후에 공개된 문헌으로, 출원과 상충하지 않으며 발명의 기초가 되는 원리나 이론을 이해하기 위해 인용된 문헌

"X" 특별한 관련이 있는 문헌. 해당 문헌 하나만으로 청구된 발명의 신규성 또는 진보성이 없는 것으로 본다.

"Y" 특별한 관련이 있는 문헌. 해당 문헌이 하나 이상의 다른 문헌과 조합하는 경우로 그 조합이 당업자에게 자명한 경우 청구된 발명은 진보성이 없는 것으로 본다.

"&" 동일한 대응특허문헌에 속하는 문헌

국제조사의 실제 완료일	국제조사보고서 발송일
2018년 01월 30일 (30.01.2018)	2018년 02월 01일 (01.02.2018)

ISA/KR의 명칭 및 우편주소
대한민국 특허청
(35208) 대전광역시 서구 청사로 189,
4동 (둔산동, 정부대전청사)
팩스 번호 +82-42-481-8578

심사관
진상범
전화번호 +82-42-481-8398

서식 PCT/ISA/210 (두 번째 용지) (2015년 1월)

국 제 조 사 보 고 서
대응특허에 관한 정보

국제출원번호
PCT/KR2017/012319

국제조사보고서에서 인용된 특허문헌	공개일	대응특허문헌	공개일
WO 2016-162480 A1	2016/10/13	없음	
US 2014-0198768 A1	2014/07/17	없음	

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 309 of 522

PTO-1390 (01-18)
Approved for use through 8/31/2019. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.	
811.0180	
U.S. Application No. (if known, see 37 CFR 1.5)	

International Application No.	International Filing Date	Priority Date Claimed
PCT/KR2017/012319	November 2, 2017	November 3, 2016

Title of Invention
METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

First Named Inventor
HONG, Sung-pyo

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☒ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☒ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☒ A preliminary amendment.
11. ☒ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☒ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825 (not required if sequence listing in text format was indicated on the PCT Request as part of the International Application and the sequence listing was published as part of the international application).
15. ☐ Assignment papers *(cover sheet and document(s))*. Name of Assignee: _____
16. ☐ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

PTO-1390 (01-18)
Approved for use through 8/31/2019. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
	PCT/KR2017/012319	811.0180

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS
18. ■ Basic national fee (37 CFR 1.492(a)) **$300**	$ 300
19. ■ Examination fee (37 CFR 1.492(c)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • All other situations **$760**	$ 760
20. ■ Search fee (37 CFR 1.492(b)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$140** • International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... **$520** • All other situations **$660**	520 $
TOTAL OF 18, 19, and 20 =	$ 1,580
☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)). Fee for each additional 50 sheets of paper or fraction thereof **$400**	

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/ 50 =		x **$400**	$
Surcharge for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h))..... **$140**				$

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	19 - 20 =		x **$100**	$ 0
Independent claims	3 - 3 =		x **$460**	$ 0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$820**	$
Fee for submission of Sequence Listing text file of 300 MB to 800 MB (37 CFR 1.21(o)(1))..... **$1,000**				$
Fee for submission of Sequence Listing text file of more than 800 MB (37 CFR 1.21(o)(2))..... **$10,000**				$
Processing fee for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i))..... **$140** +				$
TOTAL OF ABOVE CALCULATIONS =				$ 1,580
☐ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.				
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.				
TOTAL NATIONAL FEE =				$ 1,580
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31)..... **$50.00** per property +				$
TOTAL FEES ENCLOSED =				$ 1,580

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees.

c. ☒ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 602802 as follows:

i. ☒ any required fee.

ii. ☐ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☒ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE 1: By providing this statement under 37 CFR 1.55 or 1.78, **this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA**.

NOTE 2: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

☒ The address associated with Customer Number: 76277 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country			Telephone		
Email					

Signature	/Ian M. Hughes/	Date	05/02/2019
Name (Print/Type)	Ian M. Hughes, Esq.	Registration No. (Attorney/Agent)	41,083

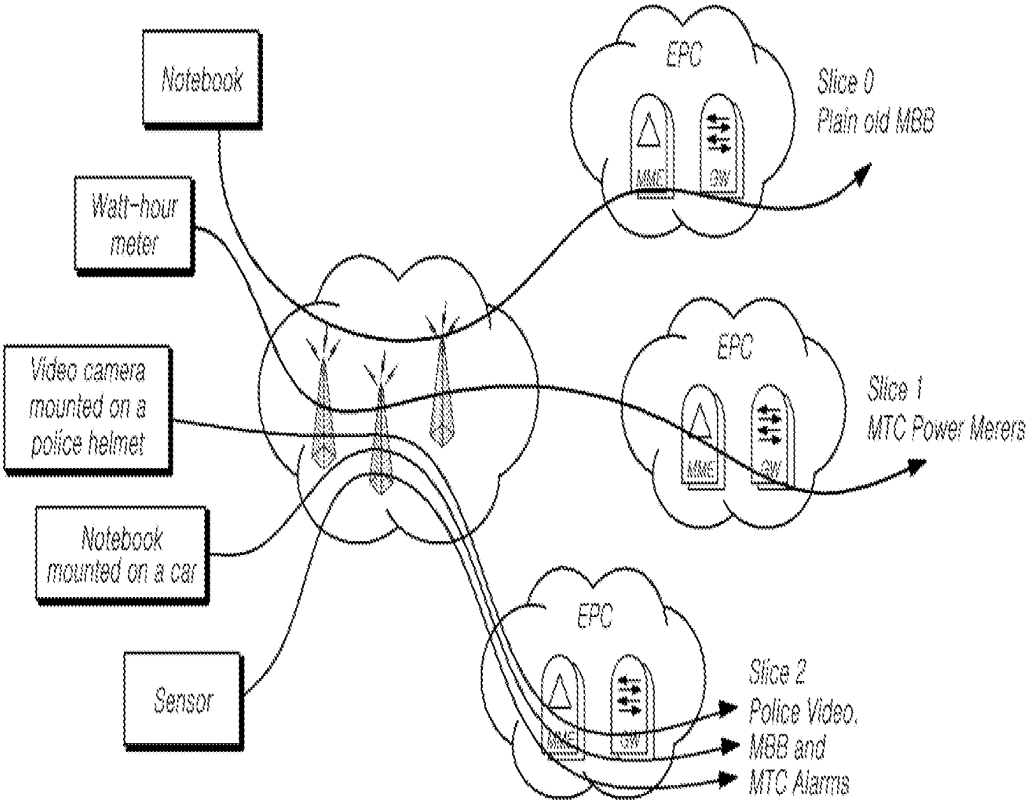
Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

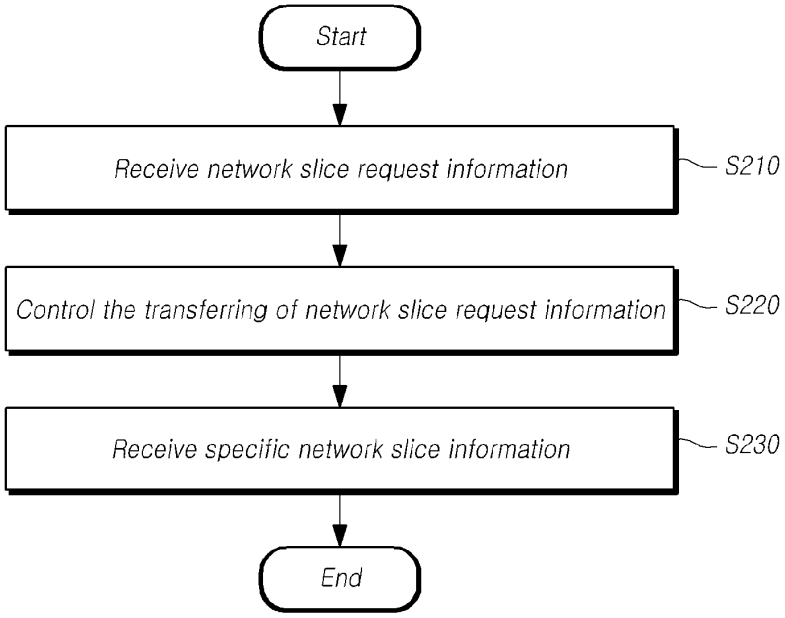
1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

FIG.1



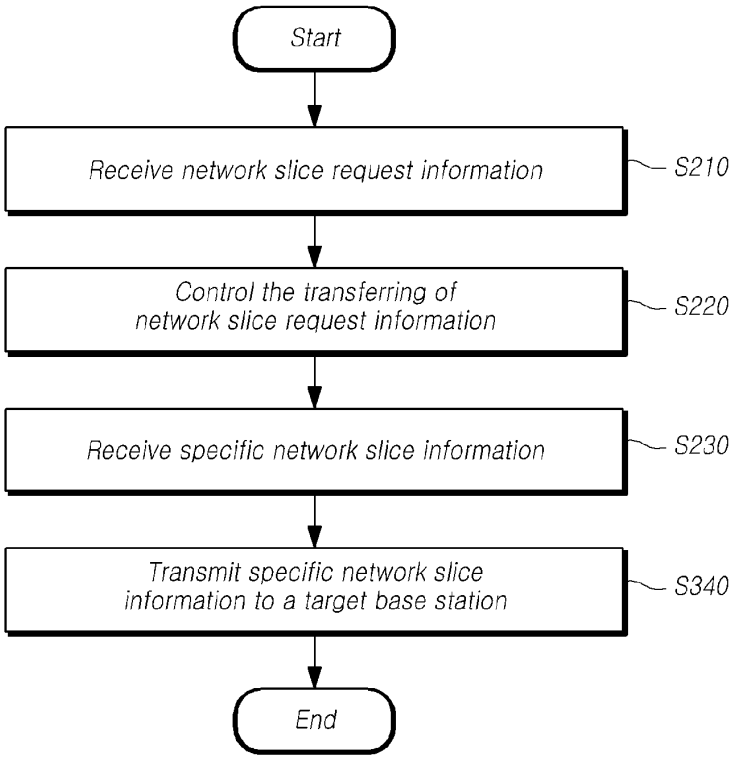
Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 314 of 522

FIG.2



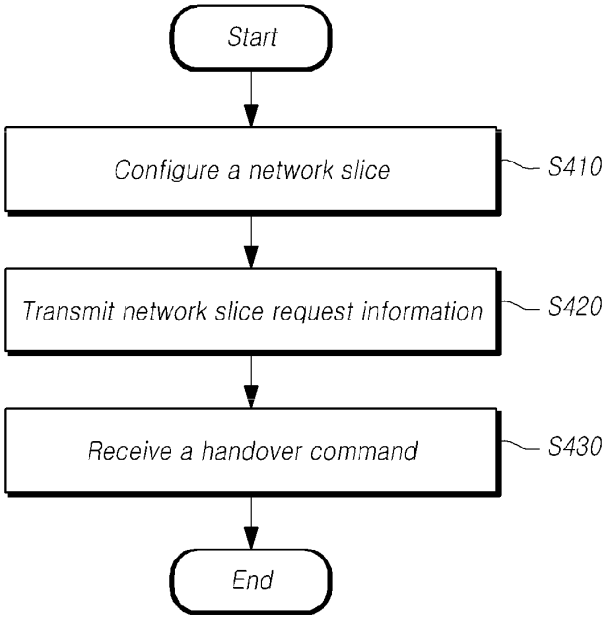
Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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FIG.3



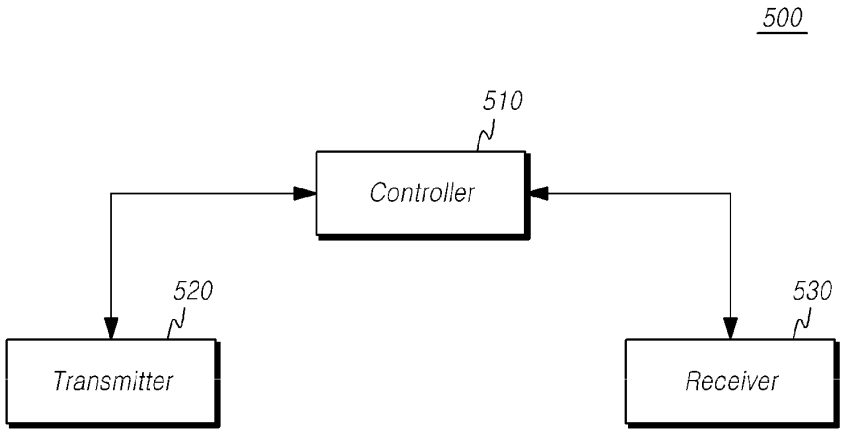
Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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FIG.4



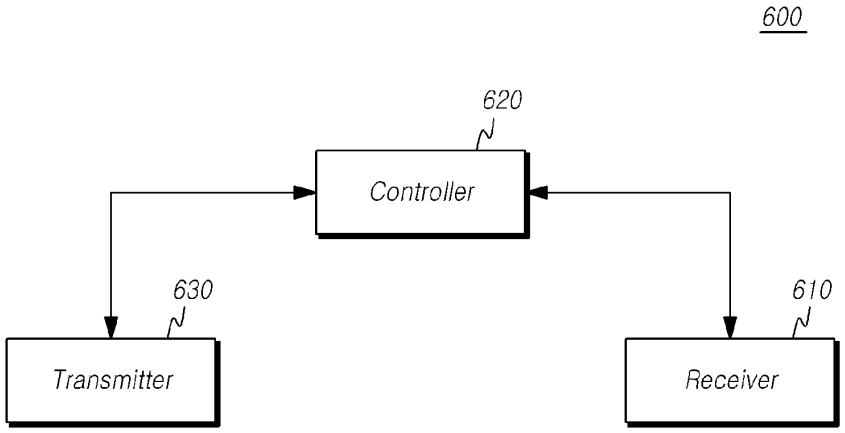
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FIG.5



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FIG.6



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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	811.0180
	Application Number	
Title of Invention	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Sung-pyo		HONG	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Seoul	Country of Residence [i]	KR

Mailing Address of Inventor:

Address 1	(Korea Telecom Research Center, Umyeon-dong) 151
Address 2	Taebong-ro, Seocho-gu
City	Seoul
State/Province	
Postal Code	137-140
Country [i]	KR

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Woo-jin		CHOI	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Seoul	Country of Residence [i]	KR

Mailing Address of Inventor:

Address 1	(Korea Telecom Research Center, Umyeon-dong) 151
Address 2	Taebong-ro, Seocho-gu
City	Seoul
State/Province	
Postal Code	137-140
Country [i]	KR

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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	Application Number	
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Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	76277		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR		
Attorney Docket Number	811.0180	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	76277		

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Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/KR2017/012319	2017-11-02

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
10-2016-0146054	KR	2016-11-03	

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
10-2017-0142205	KR	2017-10-30	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	811.0180
	Application Number	
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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	811.0180
	Application Number	
Title of Invention	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	KT CORPORATION		
Mailing Address Information For Applicant:			
Address 1	(206, Jeongja-dong) 90, Buljeong-ro, Bundang-gu		
Address 2	Seongnam-si		
City	Gyeonggi-do	**State/Province**	
Country	KR	Postal Code	463-711
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	KT CORPORATION

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	(206, Jeongja-dong) 90, Buljeong-ro, Bundang-gu		
Address 2	Seongnam-si		
City	Gyeonggi-do	**State/Province**	
Country i	KR	Postal Code	463-711
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

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NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Ian M. Hughes/			Date (YYYY-MM-DD)	2019-05-02
First Name	Ian	Last Name	Hughes	Registration Number	41083

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	811.0180
	Application Number	
Title of Invention	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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【CLAIMS】

1. A method of a base station for transmitting and receiving data through a network slice, the method comprising:

receiving network slice request information from a user equipment (UE) configured with the network slice;

controlling the network slice request information to be transferred to a core network entity; and

receiving specific network slice information that is configured based on the network slice request information from the core network entity.

2. The method according to claim 1, wherein the user equipment is configured with one or more network slices, and one network slice is associated with one protocol data unit (PDU) session.

3. The method according to claim 1, wherein the network slice request information is included in a radio resource control (RRC) connection setup message or NAS message included in the RRC connection setup message.

4. The method according to claim 1, wherein the specific network slice information

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Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.

5. The method according to claim 1, further comprising, after the specific network slice information has been received from the core network entity, transmitting the specific network slice information to a target base station.

6. The method according to claim 5, wherein the transmitting to the target base station is performed through the core network entity.

7. A method of a user equipment (UE) for transmitting and receiving data through a network slice, the method comprising:

configuring the network slice;

transmitting network slice request information to a base station; and

receiving, from the base station, a handover command generated based on specific network slice information that a target base station has received from a core network entity.

8. The method according to claim 7, wherein the configuring of the network slice is performed by configuring one or more network slices, and configuring one network slice to be

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associated with one protocol data unit (PDU) session..

9. The method according to claim 7, wherein the network slice request information is included in a radio resource control (RRC) connection setup message or the NAS message included in the RRC connection setup message.

10. The method according to claim 7, wherein the base station transfers the network slice request information to the core network entity and receives the specific network slice request information configured based on the network slice request information from the core network entity.

11. A base station for transmitting and receiving data through a network slice, the base station comprising:

a receiver configured to receive network slice request information from a user equipment (UE) configured with the network slice; and

a controller configured to control the network slice request information to be transferred to a core network entity,

wherein the receiver further receives specific network slice information that is configured based on the network slice request information from the core network entity.

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12. The base station according to claim 11, wherein the user equipment is configured with one or more network slices, and one network slice is associated with one protocol data unit (PDU) session.

13. The base station according to claim 11, wherein the network slice request information is included in a radio resource control (RRC) connection setup message or the NAS message included in the RRC connection setup message.

14. The base station according to claim 11, wherein the specific network slice information is specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.

15. The base station according to claim 11, further comprising, after the specific network slice information has been received from the core network entity, a transmitter configured to transmit the specific network slice information to the target base station.

16. The base station according to claim 15, wherein the transmitter transmits the specific network slice information through the core network entity.

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17. A user equipment (UE) for transmitting and receiving data through a network slice, the user equipment comprising:

a controller configured to configure the network slice;

a transmitter configured to transmit network slice request information to a base station; and

a receiver configured to receive, from the base station, a handover command generated based on specific network slice information that a target base station has received from a core network entity.

18. The user equipment according to claim 17, wherein the controller configures one or more network slices, and configures one network slice to be associated with one protocol data unit (PDU) session.

19. The user equipment according to claim 17, wherein the network slice request information is included in a radio resource control (RRC) connection setup message or the NAS message included in the RRC connection setup message.

20. The user equipment according to claim 17, wherein the base station transfers the network slice request information to the core network entity, and receives the specific network

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slice request information configured based on the network slice request information from the core network entity.

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【ABSTRACT】

Provided are a method of a base station for controlling transmission and reception of data through a network slice. The method includes: receiving network slice request information from a terminal in which a network slice is configured; controlling so as to deliver the network slice request information to a core network entity; and receiving, from the core network entity, specific network slice information configured on the basis of the network slice request information.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference PCT17-851	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/KR2017/012319	International filing date *(day/month/year)* 02 November 2017 (02.11.2017)	Priority date *(day/month/year)* 03 November 2016 (03.11.2016)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant KT CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 07 May 2019 (07.05.2019)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Kihwan Moon e-mail: pct.team1@wipo.int

Form PCT/IB/373 (January 2004)

특 허 협 력 조 약

발신: 국제조사기관

수신:
특허법인(유한)유일하이스트

대한민국 06130 서울시 강남구 강남대로94길 59, 2층(역삼동, 옥산빌딩)

PCT

국제조사기관의 견해서

(PCT규칙 43의2.1)

발송일 *(일/월/년)*	2018년 02월 01일 (01.02.2018)
출원인 또는 대리인의 서류참조기호 PCT17-851	**추가적인 조치** 아래 2를 참조

국제출원번호	국제출원일 *(일/월/년)*	우선일 *(일/월/년)*
PCT/KR2017/012319	2017년 11월 02일 (02.11.2017)	2016년 11월 03일 (03.11.2016)

국제특허분류(IPC)
H04W 28/02(2009.01)i, H04W 76/04(2009.01)i

출원인
주식회사 케이티

1. 본 견해서는 다음 기재란에 관한 내용을 포함합니다.

- ☒ 제1기재란 견해서의 기초
- ☐ 제2기재란 우선권
- ☐ 제3기재란 신규성, 진보성 및 산업상이용가능성에 관한 견해 부작성
- ☐ 제4기재란 발명의 단일성 결여
- ☒ 제5기재란 신규성, 진보성 또는 산업상이용가능성에 관한 견해(PCT규칙 43의2.1(a)(i)), 이를 뒷받침하는 인용문헌 및 설명
- ☐ 제6기재란 특이 인용문헌
- ☐ 제7기재란 국제출원의 흠결
- ☒ 제8기재란 국제출원에 관한 의견

2. **추가적인 조치**

국제예비심사가 청구되면, 본 견해서는 국제예비심사기관("IPEA")의 견해서로 간주될 것입니다. 다만, 출원인이 본 기관 이외의 기관을 IPEA로 선택하고, 그 선택된 IPEA가 PCT규칙 66.1의2(b)에 따라 본 국제조사기관의 견해서가 위와 같이 간주되지 않을 것임을 국제사무국에 통보한 경우에는 그러하지 않습니다.

본 견해서가 상기와 같이 IPEA의 견해서로 간주되는 경우, 출원인은 서식 PCT/ISA/220의 발송일로부터 3월 또는 우선일부터 22월 중 늦게 만료되는 날 이전에 의견서 및 보정서(해당하는 경우)를 IPEA에 제출할 수 있습니다.

다른 선택사항에 대하여는 서식 PCT/ISA/220에 대한 안내문을 참조하십시오.

ISA/KR의 명칭 및 우편주소	본 견해서의 완료일	심사관
대한민국 특허청 (35208) 대전광역시 서구 청사로 189, 4동 (둔산동, 정부대전청사) 팩스번호 +82-42-481-8578	2018년 01월 30일 (30.01.2018)	진상범 전화번호 +82-42-481-8398

서식 PCT/ISA/237 (표지) (2015년 1월)

국제조사기관의 견해서

국제출원번호
PCT/KR2017/012319

제1기재란 본 견해서의 기초

1. **언어**와 관련하여, 본 견해서는 아래에 기초하여 작성되었습니다.

☒ 출원시의 언어로 된 국제출원

☐ 국제조사를 위하여 _____ 로 번역되어 제출된 국제출원의 번역문
(PCT규칙 12.3(a) 및 23.1(b))

2. ☐ 본 견해서는 PCT규칙 91에 따라 당해 기관이 허가하였거나 당해 기관에 통보된 **명백한 잘못의 정정**을 고려하여 작성되었습니다(PCT규칙 43의2.1(a)).

3. ☐ 국제출원에 개시된 핵산염기 및/또는 아미노산 서열과 관련하여, 본 견해서는 아래에 기초하여 작성되었습니다.

a. ☐ 아래의 형태로 출원시 국제출원의 일부를 구성하는 서열목록

☐ 부록 C/ST.25 텍스트 파일

☐ 서면 혹은 이미지 파일

b. ☐ PCT 규칙 13의3.1(a)에 따라 국제출원과 함께 국제조사만을 목적으로 부록 C/ST.25 텍스트 파일의 형태로 제출된 서열목록

c. ☐ 국제조사만을 목적으로 국제출원일 이후에 아래 형태로 제출된 서열목록

☐ 부록 C/ST.25 텍스트 파일 (규칙 13의3.1(a))

☐ 서면 혹은 이미지 파일 (규칙 13의3.1(b) 및 시행세칙 713)

4. ☐ 추가로 서열목록에 대하여 하나 이상의 버전이나 사본이 제출된 경우, 후속 버전 또는 추가된 사본에 기재되어 있는 정보가 출원시 출원의 일부를 구성하는 정보와 동일하거나 또는 출원시의 개시범위를 벗어나지 않는다는 진술서가 제출되었습니다.

5. 추가 의견:

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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국제조사기관의 견해서

국제출원번호
PCT/KR2017/012319

제5기재란 신규성, 진보성 또는 산업상이용가능성에 관한 견해(PCT규칙 43의2.1(a)(i)), 이를 뒷받침하는 인용문헌 및 설명

1. 견해

신규성 (N)	청구항	1-20	있음
	청구항	없음	없음
진보성 (IS)	청구항	없음	있음
	청구항	1-20	없음
산업상 이용가능성 (IA)	청구항	1-20	있음
	청구항	없음	없음

2. 인용문헌 및 설명:

참고한 인용문헌은 다음과 같습니다.

D1: ERICSSON, 'Solution for selection of a network slice instance', S2-161480, SA WG2 Meeting #114, 2016.04.05
D2: QUALCOMM INCORPORATED, 'Solution for key issue 1 on Network Slicing: Network Slice and Network Functions Selection based on evolved eDECOR model', S2-162339, SA WG2 Meeting #115, 2016.05.17
D3: WO 2016-162480 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 2016.10.13

1. 신규성 및 진보성

1.1 청구항 1-6

1.1.1 독립항 1

청구항 1 발명과 가장 근접한 인용문헌 D1에는 네트워크 슬라이스 지원 정보가 미리 구성된 UE가 네트워크 슬라이스 지원 정보를 포함하는 RRC 커넥션을 시작하고, Next Generation(NG) 등록 절차를 수행하는 단계, 및 RAN 노드가 UE로부터 수신한 네트워크 슬라이스 지원 정보로부터 도출한 네트워크 슬라이스 인스턴스 ID에 대응하는 Next Generation Core Network(NG CN) 인스턴스를 선택하고, 선택된 NG CN 인스턴스로 UE로부터 수신한 NAS 메시지를 전달하는 단계를 포함하는 슬라이스 선택 방법 (D1의 섹션 6.1.x.2 참조)이 제시되어 있습니다. 다만, 청구항 1 발명의 네트워크 슬라이스 요청 정보에 기초하여 구성된 특정 네트워크 슬라이스 정보를 코어망 개체로부터 수신하는 단계가 인용문헌 D1과 차이가 있습니다. 그러나 이는 인용문헌 D1에 제시된 NG CN이 RAN 노드로부터 수신한 네트워크 슬라이스 지원 정보를 검사하고, 네트워크 슬라이스 인스턴스가 UE에 적합한지 인증한 후, 네트워크 슬라이스 인스턴스 ID를 UE에게 제공하는 점 (D1의 섹션 6.1.x.2 참조)으로부터 용이하게 도출할 수 있습니다. 따라서 청구항 1 발명은 인용문헌

추가 기재란에 계속

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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국제조사기관의 견해서

국제출원번호
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제8기재란 국제출원에 관한 의견

청구범위, 발명의설명 및 도면의 명료성에 관하여 또는 청구범위가 발명의설명에 의하여 충분히 뒷받침되고 있는지에 관하여 다음과 같은 의견을 제시합니다.

청구항 제16항은 '방법'에 관한 것이나, 청구항 제16항이 인용하는 제15항은 '기지국'에 관한 것입니다. 따라서 청구항 제16항은 보호를 받고자 하는 사항이 무엇인지 명확히 정의되어 있지 않다는 점에서 PCT 제6조의 요건을 충족시키지 않습니다.

(참고: 본 국제조사 보고서 및 견해서에서는 청구항 제16항의 '방법'을 '기지국'으로 가정하여 작성되었습니다.)

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
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추가 기재란

이전 기재란의 공간이 충분하지 아니한 경우.
제5 기재란의 연속

D1으로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.1.2 종속항 2-6

청구항 2의 추가적인 기술적 특징은 인용문헌 D1에 명시되어있지 않습니다. 그러나, 이는 인용문헌 D2의 UE가 각각의 슬라이스에 대한 DCN ID 값을 제공하고, PDU 세션 요청에 따라 슬라이스에 대한 연결이 허락되는 점 (D2의 섹션 6.1.X.1 참조)으로부터 용이하게 도출 가능합니다.

청구항 4의 추가적인 기술적 특징은 인용문헌 D1에 명시되어있지 않습니다. 그러나, 이는 인용문헌 D2의 Mobility Management and Authentication(MMA)가 UE를 인증하면, common access security context를 생성하여 AN을 통해 UE와 MMA간에 제공되는 점 (D2의 섹션 6.1.X.2.1 참조)으로부터 용이하게 도출 가능합니다.

따라서 인용문헌 D1에 기재된 발명과 인용문헌 D2에 기재된 상기 특징을 결합하는 것은 통상의 기술자에게 자명하므로, 청구항 2, 4 발명은 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 3 발명의 추가적인 기술적 특징은 인용문헌 D1에 제시된 UE가 네트워크 슬라이스 지원 정보를 제공하는 RRC 연결을 수행하고, NAS 메시지를 RAN 노드로 전송함으로써 네트워크 슬라이스 인스턴스 인증을 수행하는 점 (D1의 섹션 6.1.x.2 참조)으로부터 용이하게 도출할 수 있습니다. 따라서 청구항 3 발명은 인용문헌 D1으로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 5-6의 추가적인 기술적 특징은 인용문헌 D1에 명시되어있지 않습니다. 그러나, 이는 인용문헌 D3의 UE가 핸드오버할 때, 선택된 네트워크 파티션 ID를 포함하는 알림을 타겟 액세스 노드에 제공하고, 제공된 네트워크 파티션 ID를 이용하여, UE가 이동하기 전에 선택된 네트워크 파티션과 동일한 네트워크 파티션을 이동한 후에도 이용하는 점 (D3의 단락 [0061], [0070], 도면 7 참조)으로부터 설계변경 가능합니다. 따라서 인용문헌 D1에 기재된 발명과 인용문헌 D3에 기재된 상기 특징을 결합하는 것은 통상의 기술자에게 자명하므로, 청구항 5-6 발명은 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

다음 페이지에 계속

Petitioners' Exhibit 1010
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추가 기재란

이전 기재란의 공간이 충분하지 아니한 경우.
이전 기재란의 연속

1.2 청구항 7-10

1.2.1 독립항 7

청구항 7 발명과 가장 근접한 인용문헌 D1에는 UE가 네트워크 슬라이스 지원 정보로 미리 구성되는 단계 및 네트워크 슬라이스 지원 정보를 포함하는 RRC 커넥션을 시작하고, Next Generation(NG) 등록 절차를 수행하며, NAS 메시지를 RAN 노드로 전송하는 단계를 포함하는 슬라이스 선택 방법 (D1의 섹션 6.1.x.2 참조)이 제시되어 있습니다. 다만, 청구항 7 발명의 타겟 기지국이 코어망 개체로부터 수신한 특정 네트워크 슬라이스 정보에 기초하여 생성한 핸드오버 명령을 기지국으로부터 수신하는 단계가 인용문헌 D1과 차이가 있습니다. 그러나 이는 인용문헌 D3에 제시된 UE가 핸드오버할 때, 선택된 네트워크 파티션 ID를 포함하는 알림을 타겟 액세스 노드에 제공하고, 제공된 네트워크 파티션 ID를 이용하여, UE가 이동하기 전에 선택된 네트워크 파티션과 동일한 네트워크 파티션을 이동한 후에도 이용하는 점 (D3의 단락 [0061], [0063], [0070], 도면 7 참조)으로부터 설계변경 가능합니다. 따라서 인용문헌 D1과 인용문헌 D3에 기재된 발명을 결합하여 청구항 7에 기재된 발명을 도출하는 것은 통상의 기술자에게 자명하므로, 청구항 7 발명은 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.2.2 종속항 8-10

청구항 8의 추가적인 기술적 특징은 인용문헌 D1 및 D3에 명시되어있지 않습니다. 그러나, 이는 인용문헌 D2의 UE가 각각의 슬라이스에 대한 DCN ID 값을 제공하고, PDU 세션 요청에 따라 슬라이스에 대한 연결이 허락되는 점 (D2의 섹션 6.1.X.1 참조)으로부터 용이하게 도출 가능합니다. 따라서 인용문헌 D1 및 D3에 기재된 발명과 인용문헌 D2에 기재된 상기 특징을 결합하는 것은 통상의 기술자에게 자명하므로, 청구항 8 발명은 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 9 발명의 추가적인 기술적 특징은 인용문헌 D1에 제시된 UE가 네트워크 슬라이스 지원 정보를 제공하는 RRC 연결을 수행하고, NAS 메시지를 RAN 노드로 전송함으로써 네트워크 슬라이스 인스턴스 인증을 수행하는 점 (D1의 섹션 6.1.x.2 참조)으로부터 용이하게 도출할 수 있습니다.

청구항 10 발명의 추가적인 기술적 특징은 인용문헌 D1에 제시된 RAN 노드가 UE로부터 수신한 네트워크 슬라이스 지원 정보로부터 도출한 네트워크 슬라이스 인스턴스 ID에 대

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추가 기재란

이전 기재란의 공간이 충분하지 아니한 경우.
이전 기재란의 연속

응하는 Next Generation Core Network(NG CN) 인스턴스를 선택하고, 선택된 NG CN 인스턴스로 UE로부터 수신된 NAS 메시지를 전달하며, NG CN은 RAN 노드로부터 수신한 네트워크 슬라이스 지원 정보를 검사하고, 네트워크 슬라이스 인스턴스가 UE에 적합한지 인증한 후, 네트워크 슬라이스 인스턴스 ID를 UE에게 제공하는 점 (D1의 섹션 6.1.x.2 참조)으로부터 용이하게 도출할 수 있습니다.

따라서 인용문헌 D1 및 D3에 기재된 발명을 결합하는 것은 통상의 기술자에게 자명하므로, 청구항 9-10 발명은 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.3 청구항 11-16

1.3.1 독립항 11

청구항 11 발명은 청구항 1 발명의 방법을 수행하는 기지국에 대한 것으로, 청구항 1 발명과 기술적 특징이 실질적으로 동일합니다. 따라서 청구항 1 발명이 진보성이 없으므로, 청구항 11에 기재된 발명은 인용문헌 D1으로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.3.2 종속항 12-16

청구항 12, 14 발명은 기지국에 관한 발명으로, 청구항 2, 4 발명의 기술적 특징을 카테고리를 달리하여 각각 기재하고 있습니다. 따라서 청구항 2, 4 발명이 진보성이 없으므로, 청구항 12, 14에 기재된 발명은 인용문헌 D1 및 D2로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 13 발명은 기지국에 관한 발명으로, 청구항 3 발명의 기술적 특징을 카테고리를 달리하여 기재하고 있습니다. 따라서 청구항 3 발명이 진보성이 없으므로, 청구항 13에 기재된 발명은 인용문헌 D1으로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 15-16 발명은 기지국에 관한 발명으로, 청구항 5-6 발명의 기술적 특징을 카테고리를 달리하여 각각 기재하고 있습니다. 따라서 청구항 5-6 발명이 진보성이 없으므로, 청구항 15-16에 기재된 발명은 인용문헌 D1 및 D3로부터 PCT 제33조(2)에 따른 신규성이 있으

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추가 기재란

이전 기재란의 공간이 충분하지 아니한 경우.
이전 기재란의 연속

나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.4 청구항 17-20

1.4.1 독립항 17

청구항 17 발명은 청구항 7 발명의 방법을 수행하는 단말에 대한 것으로, 청구항 7 발명과 기술적 특징이 실질적으로 동일합니다. 따라서 청구항 7 발명이 진보성이 없으므로, 청구항 17에 기재된 발명은 인용문헌 D1 및 D3로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

1.4.2 종속항 18-20

청구항 18 발명은 기지국에 관한 발명으로, 청구항 8 발명의 기술적 특징을 카테고리를 달리하여 기재하고 있습니다. 따라서 청구항 8 발명이 진보성이 없으므로, 청구항 18에 기재된 발명은 인용문헌 D1, D3 및 D2로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

청구항 19-20 발명은 기지국에 관한 발명으로, 청구항 9-10 발명의 기술적 특징을 카테고리를 달리하여 각각 기재하고 있습니다. 따라서 청구항 9-10 발명이 진보성이 없으므로, 청구항 19-20에 기재된 발명은 인용문헌 D1 및 D3로부터 PCT 제33조(2)에 따른 신규성이 있으나, PCT 제33조(3)에 따른 진보성은 없습니다.

2. 산업상 이용가능성

청구항 1-20 발명은 PCT 제33조(4)에 따라 산업상 이용 가능합니다.

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference PCT17-851	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/KR2017/012319	International filing date *(day/month/year)* 02 November 2017 (02.11.2017)	Priority date *(day/month/year)* 03 November 2016 (03.11.2016)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant KT CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 13 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☒	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 07 May 2019 (07.05.2019)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Kihwan Moon e-mail: pct.team1@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	01.02.2018
Applicant's or agent's file reference: PCT17-851	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/KR2017/012319	02.11.2017	03.11.2016

International Patent Classification (IPC) or both national classification and IPC
H04W28/02(2009.01)i, H04W76/04(2009.01)i

Applicant
KT CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☒ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/KR2017/012319

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

a. ☐ forming part of the international application as filed:

☐ in the form of an Annex C/ST.25 text file.

☐ on paper or in the form of an image file.

b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Reference is made to the following documents:

D1: ERICSSON, "Solution for Selection of a Network Slice Instance", S2-161480, SA WG2 Meeting #114, 05 April 2016

D2: QUALCOMM INCORPORATED, "Solution for Key Issue 1 on Network Slicing: Network Slice and Network Functions Selection Based on Evolved eDECOR Model", S2-162339, SA WG2 Meeting #115, 17 May 2016

D3: WO 2016-162480 A1 (TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)) 13 October 2016

1. Novelty and Inventive Step

1.1 Claims 1-6

1.1.1 Independent Claim 1

Document D1, which is most relevant to the invention as in claim 1, discloses a slice selection method comprising the steps of: initiating, by a UE having previously

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configured network slice support information, an RRC connection including the network slice support information and performing a next generation (NG) registration procedure; and selecting, by an RAN node, a next generation core network (NG CN) instance corresponding to a network slice instance ID derived from the network slice support information received from the UE, and transmitting an NAS message received from the UE to the selected NG CN instance (see D1, section 6.1.x.2). The invention as in claim 1 only differs from the invention disclosed in document D1 with respect to a step of receiving, from a core network entity, specific network slice information configured on the basis of network slice request information. However, said difference could be readily derived from the feature, disclosed in document D1, wherein an NG CN examines network slice support information received from an RAN node, authenticates whether a network slice instance is suitable for UE, and then provides the network slice instance ID to the UE (see D1, section 6.1.x.2). Therefore, the invention as in claim 1 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of document D1.

1.1.2 Dependent Claims 2-6

The additional technical feature in claim 2 is not clearly disclosed in document D1. However, said additional technical feature could be readily derived from the feature, in document D2, wherein UE provides a DCN ID value for each slice, and a connection to a slice is permitted according to a PDU session request (see D2,

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section 6.1.X.1).

The additional technical feature in claim 4 is not clearly disclosed in document D1. However, said additional technical feature could be readily derived from the feature, in document D2, wherein, when a mobility management and authentication (MMA) authenticates UE, a common access security context is generated and provided between the UE and the MMA through an AN (see D2, section 6.1.X.2.1)

Therefore, it would be obvious to a person skilled in the art to combine the invention disclosed in document D1 and the features disclosed in document D2, and thus the invention as in claims 2 and 4 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

The additional technical feature of the invention as in claim 3 could be readily derived from the feature, disclosed in document D1, wherein UE performs an RRC connection for providing network slice support information and transmits an NAS message to an RAN node such that a network slice instance authentication is performed (see D1, section 6.1.x.2). Therefore, the invention as in claim 3 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of document D1.

The additional technical features in claims 5-6 are not clearly disclosed in document D1. However, said additional technical features amount to design changes

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that could be made to the feature, in document D3, wherein, when UE performs handover, a notification including a selected network partition ID is provided to a target access node, and the same network partition as selected before the UE moves is used even after the UE moves, by using the provided network partition ID (see D3, paragraphs [0061] and [0070] and figure 7). Therefore, it would be obvious to a person skilled in the art to combine the invention disclosed in document D1 and the feature disclosed in document D3, and thus the invention as in claims 5-6 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2 Claims 7-10

1.2.1 Independent Claim 7

Document D1, which is most relevant to the invention as in claim 7, discloses a slice selection method comprising the steps of: allowing UE to be previously configured by using network slice support information; and initiating an RRC connection including the network slice support information, performing an NG registration procedure, and transmitting an NAS message to an RAN node (see D1, section 6.1.x.2). The invention as in claim 7 only differs from the invention disclosed in document D1 with respect to a step of receiving, from a base station, a handover command generated by a target base station on the basis of specific network slice information received from a core network entity. However, said difference amounts to a design change that could be made to the

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feature, disclosed in document D3, wherein, when UE performs handover, a notification including a selected network partition ID is provided to a target access node, and the same network partition as selected before the UE moves is used even after the UE moves, by using the provided network partition ID (see D3, paragraphs [0061], [0063], and [0070] and figure 7). Therefore, it would be obvious to a person skilled in the art to derive the invention as in claim 7 by combining the inventions disclosed in documents D1 and D3, and thus the invention as in claim 7 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.2 Dependent Claims 8-10

The additional technical feature in claim 8 is not clearly disclosed in documents D1 and D3. However, said additional technical feature could be readily derived from the feature, in document D2, wherein, UE provides a DCN ID value for each slice, and a connection to a slice is permitted according to a PDU session request (see D2, section 6.1.X.1). Therefore, it would be obvious to a person skilled in the art to combine the inventions disclosed in documents D1 and D3 and the feature disclosed in document D2, and thus the invention as in claim 8 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

The additional technical feature of the invention as in claim 9 could be readily derived from the feature, disclosed in document D1, wherein UE performs an RRC connection for providing network slice support

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information and transmits an NAS message to an RAN node such that a network slice instance authentication is performed (see D1, section 6.1.x.2).

The additional technical feature of the invention as in claim 10 could be readily derived from the feature, disclosed in document D1, wherein an RAN node selects an NG CN instance corresponding to a network slice instance ID derived from network slice support information received from UE and transmits an NAS message received from the UE to the selected NG CN instance, and the NG CN examines the network slice support information received from the RAN node, authenticates whether a network slice instance is suitable for the UE, and then provides an ID of the network slice instance to the UE (see D1, section 6.1.x.2).

Therefore, it would be obvious to a person skilled in the art to combine the inventions disclosed in documents D1 and D3, and thus the invention as in claims 9-10 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.3 Claims 11-16

1.3.1 Independent Claim 11

The invention as in claim 11 pertains to a base station for performing the method of the invention as in claim 1, and thus the invention as in claim 11 has substantially the same technical features as the invention as in claim 1. Therefore, the invention as in claim 1 lacks an

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inventive step, and thus the invention as set forth in claim 11 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of document D1.

1.3.2 Dependent Claims 12-16

The invention as in claims 12 and 14 pertains to a base station, and the technical features of the invention as in claims 12 and 14 differ from those of the invention as in claims 2 and 4 only in the category, respectively. Therefore, the invention as in claims 2 and 4 lacks an inventive step, and thus the invention as set forth in claims 12 and 14 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of documents D1 and D2.

The invention as in claim 13 pertains to a base station, and the technical feature of the invention as in claim 13 differs from that of the invention as in claim 3 only in the category. Therefore, the invention as in claim 3 lacks an inventive step, and thus the invention as set forth in claim 13 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of document D1.

The invention as in claims 15-16 pertains to a base station, and the technical features of the invention as in claims 15-16 differ from those of the invention as in claims 5-6 only in the category, respectively. Therefore, the invention as in claims 5-6 lacks an inventive step, and thus the invention as set forth in claims 15-16 is

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novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of documents D1 and D3.

1.4 Claims 17-20

1.4.1 Independent Claim 17

The invention as in claim 17 pertains to a terminal for performing the method of the invention as in claim 7, and thus the invention as in claim 17 has substantially the same technical features as the invention as in claim 7. Therefore, the invention as in claim 7 lacks an inventive step, and thus the invention as set forth in claim 17 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of documents D1 and D3.

1.4.2 Dependent Claims 18-20

The invention as in claim 18 pertains to a base station, and the technical feature of the invention as in claim 18 differs from that of the invention as in claim 8 only in the category. Therefore, the invention as in claim 8 lacks an inventive step, and thus the invention as set forth in claim 18 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of documents D1, D3, and D2.

The invention as in claims 19-20 pertains to a base station, and the technical features of the invention as in claims 19-20 differ from those of the invention as in

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Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

claims 9-10 only in the category, respectively.
Therefore, the invention as in claims 9-10 lacks an inventive step, and thus the invention as set forth in claims 19-20 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3) in the light of documents D1 and D3.

2. Industrial Applicability

The invention as in claims 1-20 is industrially applicable under PCT Article 33(4).

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/KR2017/012319

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 16 pertains to "a method", but claim 15 to which claim 16 refers pertains to "a base station". Therefore, since claim 16 does not clearly define the matter for which protection is sought, claim 16 does not meet the requirement of PCT Article 6.

(Note: The present international search report and written opinion have been established on the basis of the assumption that "a method" in claim 16 is "a base station".)

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UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/346,987	Sung-pyo HONG	811.0180

76277
IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

INTERNATIONAL APPLICATION NO.	
PCT/KR2017/012319	
I.A. FILING DATE	PRIORITY DATE
11/02/2017	11/03/2016

CONFIRMATION NO. 4995
371 ACCEPTANCE LETTER

OC000000112543508

Date Mailed: 11/13/2019

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

05/02/2019
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 05/02/2019
- English Translation of the IA filed on 05/02/2019
- Copy of the International Search Report filed on 05/02/2019
- Preliminary Amendments filed on 05/02/2019
- Information Disclosure Statements filed on 05/02/2019
- Inventor's Oath or Declaration filed on 05/02/2019
- Request for Immediate Examination filed on 05/02/2019
- U.S. Basic National Fees filed on 05/02/2019
- Authorize Access to Search Results filed on 05/02/2019
- Priority Documents filed on 05/02/2019
- Power of Attorney filed on 05/02/2019
- Authorization to Permit Access filed on 05/02/2019
- Application Data Sheet (37 CFR 1.76) filed on 05/02/2019

FORM PCT/DO/EO/903 (371 Acceptance Notice)

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Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

DEBORAH D WILLIAMS

Telephone: (571) 272-0466

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Petitioners' Exhibit 1010
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/346,987	05/02/2019		1580	811.0180	19	3

CONFIRMATION NO. 4995

76277
IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

FILING RECEIPT



Date Mailed: 11/13/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

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Inventor(s)

Sung-pyo HONG, Seoul, KOREA, REPUBLIC OF;
Woo-jin CHOI, Seoul, KOREA, REPUBLIC OF;

Applicant(s)

KT CORPORATION, Gyeonggi-do, KOREA, REPUBLIC OF;

Assignment For Published Patent Application

KT CORPORATION, Gyeonggi-do, KOREA, REPUBLIC OF

Power of Attorney: The patent practitioners associated with Customer Number 76277

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/KR2017/012319 11/02/2017

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
REPUBLIC OF KOREA 10-2017-0142205 10/30/2017
REPUBLIC OF KOREA 10-2016-0146054 11/03/2016

Permission to Access Application via Priority Document Exchange: Yes

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Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 11/09/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/346,987**

Projected Publication Date: 02/20/2020

Non-Publication Request: No

Early Publication Request: No

Title

METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

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countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/346,987

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	520
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	19 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1580

APPLICATION AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
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The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	2464
Examiner Name	NGO, RICKY QUOC
Attorney Docket Number	811.0180

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2464
	Examiner Name	NGO, RICKY QUOC
	Attorney Docket Number	811.0180

	1	3GPP, "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on Architecture for Next Generation System (Release 14)", 3GPP TR 23.799 V1.0.0, September 2016	X

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2464
	Examiner Name	NGO, RICKY QUOC
	Attorney Docket Number	811.0180

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2020-02-10
Name/Print	Ian M. Hughes	Registration Number	41083

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 366 of 522

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 367 of 522

Electronic Acknowledgement Receipt

EFS ID:	38535411
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	76277
Filer:	Kyung Hee Kim/yujin Chun
Filer Authorized By:	Kyung Hee Kim
Attorney Docket Number:	811.0180
Receipt Date:	10-FEB-2020
Filing Date:	02-MAY-2019
Time Stamp:	10:43:16
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	8110180IDSForm.pdf	624726 5b5e3c1e51d2c781013c0cc4af8bc2ba1dc189ee	no	4

Warnings:

Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
2	Non Patent Literature	Ref1nonpatent1part1.pdf	17961467 c7c7f90b3192a338a8966ce3f5fba4d6a99bd6f4	no	100
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Information:					
3	Non Patent Literature	Ref1nonpatent1part2.pdf	19179498 16d6ba91d27581021e52368f8777f8a107dee505	no	100
Warnings:					
Information:					
4	Non Patent Literature	Ref1nonpatent1part3.pdf	17679083 83c7638040dc3b10341f824c454022b5ec83bd1a	no	100
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5	Non Patent Literature	Ref1nonpatent1part4.pdf	16074293 87ca5ea5d54e8ebd566bdf7f29c7c2eaa363b00e	no	100
Warnings:					
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6	Non Patent Literature	Ref1nonpatent1part5.pdf	3280446 665172928d2feac12365c9791adb1dd54e4153ba	no	23
Warnings:					
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			Total Files Size (in bytes):	74799513	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/346,987	05/02/2019	Sung-pyo HONG	811.0180

CONFIRMATION NO. 4995

76277
IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

PUBLICATION NOTICE

OC000000114853642

Title:METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

Publication No.US-2020-0059987-A1
Publication Date:02/20/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	2412
Examiner Name	PHAM, BRENDA H
Attorney Docket Number	811.0180

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2412
	Examiner Name	PHAM, BRENDA H
	Attorney Docket Number	811.0180

	1	HUAWEI, "Solution for Selection of Network Slice and CN entity", R3-162594, 3GPP TSG-RAN WG3 Meeting #93bis, Sophia Antipolis, France, 10 – 14 October 2016	☒
	2	HUAWEI et al., "RRC support for network slicing", R2-163595, 3GPP TSG-RAN WG2 Meeting #94, Nanjing, China, 23 – 27 May, 2016	☒
	3	EUROPEAN PATENT OFFICE, European Search Report of corresponding EP Patent Application No. 17867340.6, May 12, 2020	☒

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2412
	Examiner Name	PHAM, BRENDA H
	Attorney Docket Number	811.0180

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2020-06-15
Name/Print	Ian M. Hughes	Registration Number	41083

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 374 of 522

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	39719263
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	76277
Filer:	Kyung Hee Kim/yujin Chun
Filer Authorized By:	Kyung Hee Kim
Attorney Docket Number:	811.0180
Receipt Date:	15-JUN-2020
Filing Date:	02-MAY-2019
Time Stamp:	14:38:52
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	8110180IDSForm.pdf	623677 b62a32292703774efd01e3b7aece9a555f48935b	no	4

Warnings:

Information:					
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2	Non Patent Literature	Ref1nonpatent1.pdf	94109 dc03489fe6d48bf2f8d9c850feb5931ea226a51e	no	2
Warnings:					
Information:					
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Warnings:					
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		Total Files Size (in bytes):	1400161		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	586	(slice same network same request$4 same (RRC NAS))	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/08 11:06
L3	37	2 and @ad<="20161130"	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/08 11:07

10/8/2020 11:07:39 AM
C:\Users\bpham\Documents\EAST\Workspaces\Brenda1.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	2464
Examiner Name	NGO, RICKY QUOC
Attorney Docket Number	811.0180

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2464
	Examiner Name	NGO, RICKY QUOC
	Attorney Docket Number	811.0180

	1	3GPP, "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on Architecture for Next Generation System (Release 14)", 3GPP TR 23.799 V1.0.0, September 2016	X

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EXAMINER SIGNATURE

Examiner Signature	/BRENDA H PHAM/ (04/06/2020)	Date Considered	04/06/2020

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2464
	Examiner Name	NGO, RICKY QUOC
	Attorney Docket Number	811.0180

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2020-02-10
Name/Print	Ian M. Hughes	Registration Number	41083

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 382 of 522

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	482	(slice same request$4 same (base adj station))	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:31
L2	44	((slice near request$4) same (base adj station))	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:33
L3	193	1 and @ad<="20171030"	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:33

10/6/2020 6:05:48 PM
C:\Users\bpham\Documents\EAST\Workspaces\15535472.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	2464
Examiner Name	NGO, RICKY QUOC
Attorney Docket Number	811.0180

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	First Named Inventor	Sung-pyo HONG
	Art Unit	2464
	Examiner Name	NGO, RICKY QUOC
	Attorney Docket Number	811.0180

	1	3GPP, "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Study on Architecture for Next Generation System (Release 14)", 3GPP TR 23.799 V1.0.0, September 2016	X

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EXAMINER SIGNATURE

Examiner Signature	/BRENDA H PHAM/ (04/06/2020)	Date Considered	04/06/2020

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2020-02-10
Name/Print	Ian M. Hughes	Registration Number	41083

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 387 of 522

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/346,987	HONG et al.
	Examiner	Art Unit
	BRENDA H PHAM	2412

CPC - Searched*		
Symbol	Date	Examiner
(H04W76/27.cpc. H04L41/0806.cpc. H04W36/0072.cpc. H04W36/08 .cpc. H04W72/085.cpc. H04W4/70.cpc.)	10/08/2020	b.p.

CPC Combination Sets - Searched*		
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US Classification - Searched*			
Class	Subclass	Date	Examiner

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Search Notes		
Search Notes	Date	Examiner
EAST	10/08/2020	b.p.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/BRENDA H PHAM/ Primary Examiner, Art Unit 2412	

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Page 388 of 522

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
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Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	
Examiner Name	
Attorney Docket Number	811.0180

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	1	20180139660	A1	2018-05-17	Stefan Rommer et al.	
	2	20140198768	A1	2014-07-17	Gene Beck HAHN et al.	
	3	20140199982	A1	2014-07-17	Gene Beck HAHN et al.	

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	1	2016/162480	WO	A1	2016-10-13	TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)		X

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	ERICSSON, "Solution for selection of a network slice instance", S2-161480, SA WG2 Meeting #114, 11-15 April 2016, Sophia Antipolis, pp. 1-4	X
	2	QUALCOMM INCORPORATED, "Solution for key issue 1 on Network Slicing: Network Slice and Network Functions Selection based on evolved eDECOR model", S2-162339, SA WG2 Meeting #115, 23 - 27 May 2016, Nanjing, P.R. China, pp. 1-7	☒
	3	SAMSUNG, "Solution for Network Slice Selection based on the NG UE's service context", S2-162622, SA WG2 Meeting #115, 23 - 27 May 2016, Nanjing, P.R. China, pp. 1-4	☒

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Examiner Signature	/BRENDA H PHAM/ (04/06/2020)	Date Considered	04/06/2020

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	Art Unit	
	Examiner Name	
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Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2019-05-02
Name/Print	Ian M. Hughes	Registration Number	41083

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Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 392 of 522

Bibliographic Data

Application No: 16/346,987

Foreign Priority claimed: (•) Yes ( ) No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /BRENDA H PHAM/ Examiner's Signature | Initials

Title: METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/02/2019	370	2412	811.0180
RULE			

APPLICANTS

KT CORPORATION, Gyeonggi-do, KOREA, REPUBLIC OF

INVENTORS

Sung-pyo HONG, Seoul, KOREA, REPUBLIC OF

Woo-jin CHOI, Seoul, KOREA, REPUBLIC OF

CONTINUING DATA

This application is a 371 of PCT/KR2017/012319 11/02/2017

FOREIGN APPLICATIONS

KOREA, REPUBLIC OF KR10-2016-0146054 11/03/2016

KOREA, REPUBLIC OF KR10-2017-0142205 10/30/2017

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	811.0180	4995

76277 7590 10/14/2020

IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

EXAMINER
PHAM, BRENDA H

ART UNIT	PAPER NUMBER
2412	

NOTIFICATION DATE	DELIVERY MODE
10/14/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 16/346,987	Applicant(s) HONG et al.	
	Examiner BRENDA H PHAM	Art Unit 2412	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on May 2, 2019.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on May 2, 2019 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☑ All b)☐ Some** c)☐ None of the:

1.☑ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 395 of 522

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

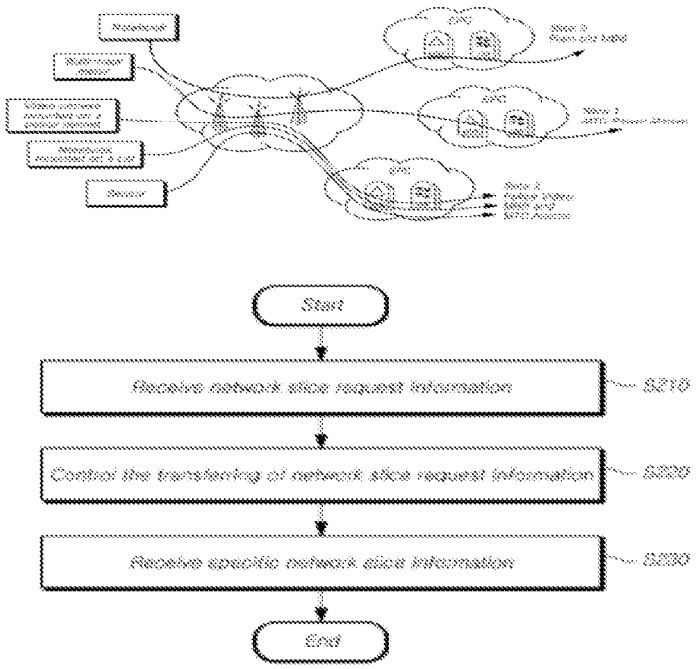
2. Claims 1-20 are pending.

Information Disclosure Statement (IDS)

3. The information disclosure statement (IDS) submitted on June 15, 2020, February 10, 2020 and May 2, 2019 is being considered by the examiner.

4. Figures 1 and of the application are directed to the claimed invention.

FIG. 1



Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case maybe, names another inventor and was effectively filed before the effective filing date of the claimed invention.

6. Claims 1, 3-7, 9-11, 13-17, 19 and 20 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Bae et al. (US 2018/0007552 A1).

Regarding claims 1, 7, 11 and 17, Bae et al. discloses a User equipment, a base station, a method of a base station for transmitting and receiving data through a network slice, the method comprising:

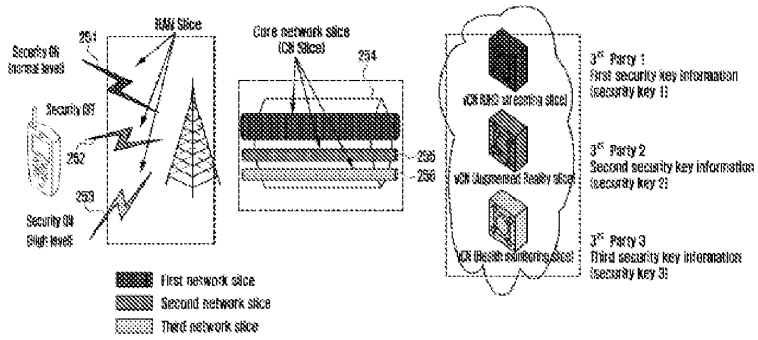
receiving network slice request information from a user equipment (UE) configured with the network slice ([0012]: "a method of a network comprising: receiving connection request messages for network slices, which are networks constructed for each service, from a terminal;");

controlling the network slice request information to be transferred to a core network entity ([0012]: "generating security contexts for each network slice based on at least one of identifiers of the network slices and tokens generated during an authentication process with a third party; and transmitting messages including the security contexts generated for each network slice to the base station."; and

receiving specific network slice information that is configured based on the network slice request information from the core network entity.

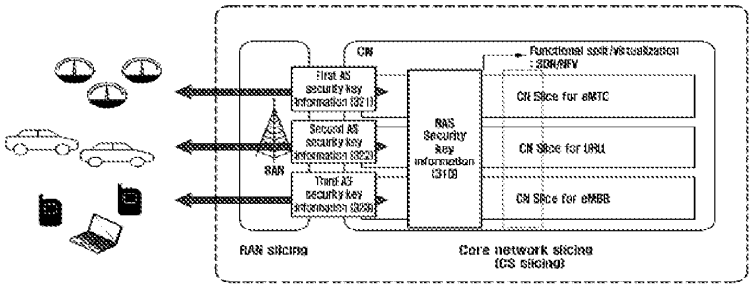
([0132]: "Next, in step S570, the base station may transmit RRC connection reconfiguration message (5G RRC connection reconfiguration) or attach accept message to the terminal as a response to the connection request message of the terminal.

FIG. 2C



Patent Application Publication Jan. 4, 2018 Sheet 4 of 25 US 2018/0007552

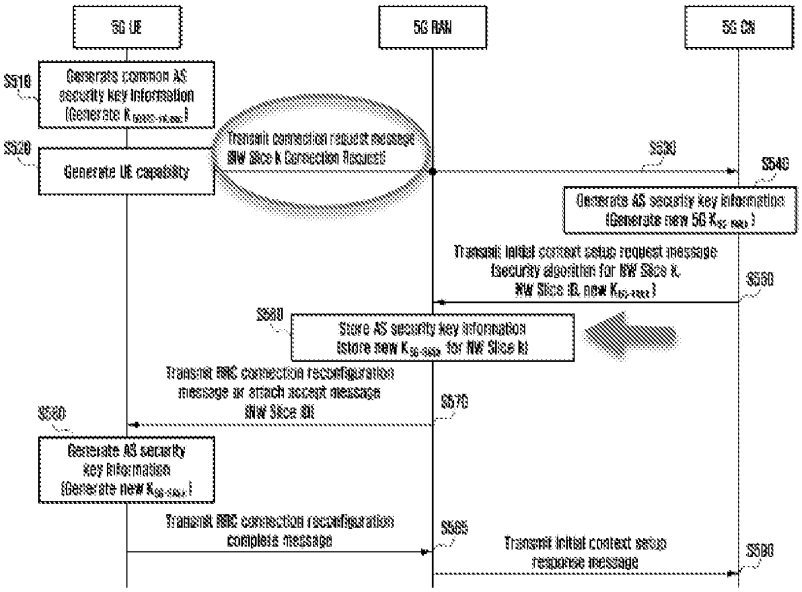
FIG. 3



Regarding claims 3, 9, 13 and 19, Bae et al. discloses the method according to claim 1, **wherein the network slice request information is included in a radio resource control (RRC) connection setup message or NAS message included in the RRC connection setup message.** ([0113]: "the terminal may use the NAS security key information to generate common AS security key information 450 K.sub.5G-RAN. The common AS security key may refer to a security key, which is commonly applied, to support one RRC connection.")

US Application Publication Jan. 4, 2018 Sheet 5 of 25 US 2018/0007552

FIG. 5



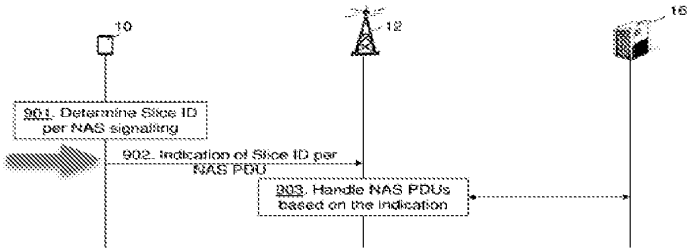
Regarding claims 4, 10, 14 and 20, Bae et al. discloses the method of claim 1, **wherein the specific network slice information specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.** ([0016]: "a controller receiving a setup request message including a generated security context from a network based on at least one of identifier of network slices which are networks constructed for each service and tokens generated during an authentication process with a third party.")

Regarding claims 5-6, 15-16, 10 and 20, Bae et al. discloses the method according to claim 1, further comprising, **after the specific network slice information has been received from the core network entity, transmitting the specific network slice information to a target base station.** (5ee figure 5).

7. Claims 1-20 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by MYHRE et al. (US 2018/0124854 A1).

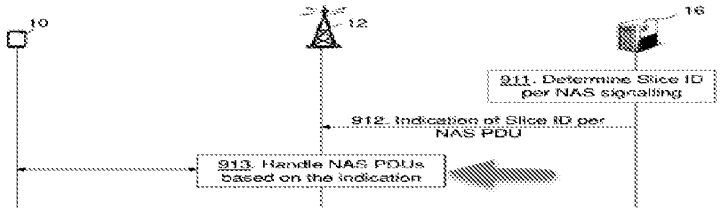
Regarding claims 1, 7, 11 and 17, MYHRE et al. discloses a User equipment, a base station, a method of a base station for transmitting and receiving data through a network slice, the method comprising:

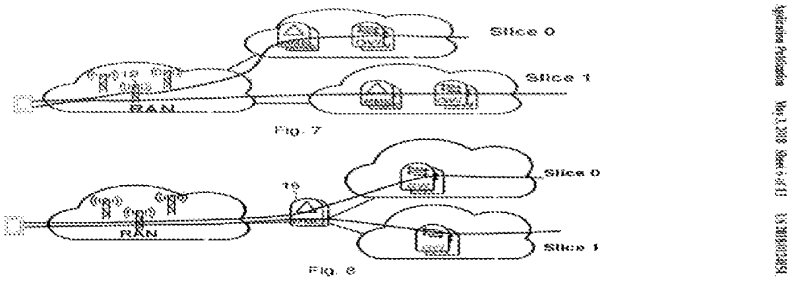
receiving network slice request information from a user equipment (UE) configured with the network slice;



controlling the network slice request information to be transferred to a core network entity (903 "Handle NAS PDUs based on the indication"); and

receiving specific network slice information that is configured based on the network slice request information from the core network entity. See figures 9a, 9b.





Regarding claims 2, 8, 12 and 18, MYHRE et al. discloses the method according to claim 1, **wherein the user equipment is configured with one or more network slices, and one network slice is associated with one protocol data unit (PDU) session**. ([0059]: "The receiving communication device is configured to receive from a transmitting communication device, a NAS PDU and an indication over a signaling connection carrying NAS PDUs.")

Regarding claims 3, 9, 13 and 19, MYHRE et al. discloses the method of claim 1, **wherein the network slice request information is included in a radio control RRC connection setup message or NAS message included in the RRC connection setup message.** ([0119]: "[0121] When the UE context is created in the radio network node 12, the core network node 16 may provide information in the S1AP INITIAL CONTEXT SETUP REQUEST message. In one example this consists of the core network node 16 indicating a network slice information in this message and the radio network node 12 can use the network slice information to select for example a related priority level for NAS signaling for this UE context."); ([0100]: "Action 902. The wireless device 10 then adds information, the indication, to a message e.g., an RRC message, which indication indicates the association between the NAS PDU and the first network slice.")

Regarding claims 4, 10, 14 and 20, MYHRE et al. discloses the method of claim 1, **wherein the specific network slice information specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.** ([0119]: "[0121]: "When the

UE context is created in the radio network node 12, the core network node 16 may provide information in the S1AP INITIAL CONTEXT SETUP REQUEST message. In one example this consists of the core network node 16 indicating a network slice information in this message and the radio network node 12 can use the network slice information to select for example a related priority level of NAS signaling for this UE context.")

Regarding claims 5 and 15, MYHRE et al. discloses the method of claim 1, further comprises, **after the specific network slice information has been received from the core network entity, transmitting the specific network slice information to a target station.** (see figure 9b).

Regarding claims 6, 10, 16 and 20, MYHRE et al. discloses the method according to claim 5, **wherein the transmitting to the target base station is performed through the core network entity.** (See figure 8 and 9b)

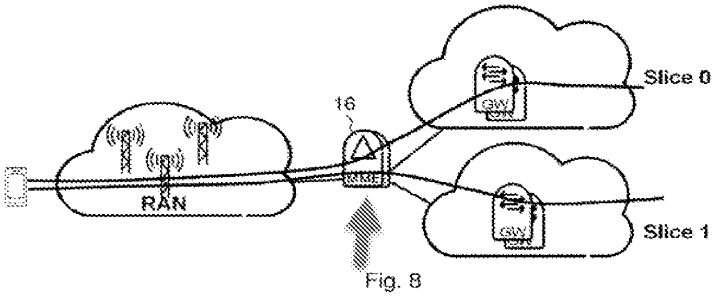
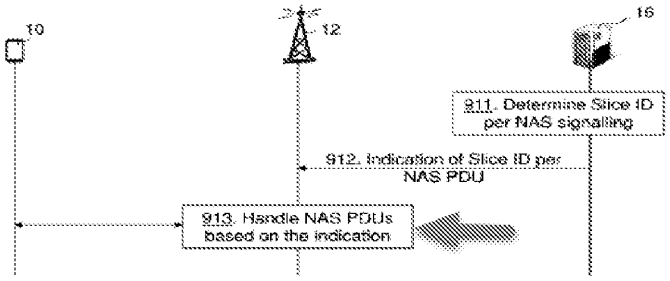


Fig. 8



Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 2, 8, 12 and 18 are rejected under 35 U.S.C. 103 as being unpatentable over Bae et al. (US 2018/0007552 A1) in view of VRZIC et al. (US 2016/0353465 A1).

Regarding claims 2, 8, 12 and 18, although Bae et al. do not explicitly disclose **wherein the user equipment is configured with one or more network slice, and one network slice is associated with one protocol data unit (PDU) session**, it is inherently implementing in Bae et al. one network slice associated with one protocol data unit (PDU) session.

In an alternative, VRZIC et al. in the same field of invention, discloses ([0041]: "network slicing allows the instantiation of separate network slices respectively directed toward different network services. This allows for separation of different types of traffic, the different types of traffic potentially having different packet processing requirement and QoS requirements. Network slicing may correspond to the allocation of pooled resources to offer different services to different customers or groups of customers, such that different services are supported by different customized virtual networks, where the different customize virtual networks are substantially separate from one another from the customer's point of view."

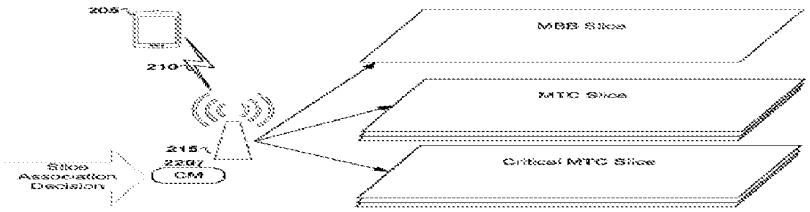
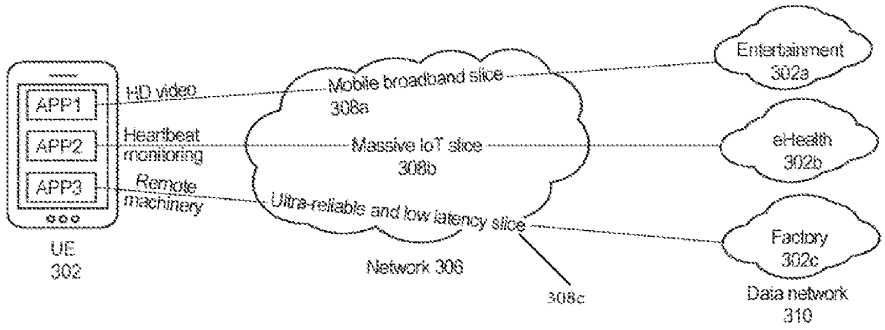


FIG. 2B

Therefore, it would have been obvious to those having ordinary skill in the art before the effective filing date of the claimed invention to combine VRZIC et al. with Bae et al. for process different QoS packets.

10. The prior art made of record and not relied upon is considered pertinent to application disclosure:

Chen et al. (US 2017/0367036 A1) discloses network slice discovery and selection. [0040]: "The request may be a request for access to a network or UE selected RAN slice 2510 at the NR-node 2504. The request may include various context information associated with the UE 2502. The context information may include, for example and without limitation, a device type (e.g., mMTC, URLLS) of the UE 2502, a service associated with the UE 2502 (e.g., forest first monitoring or traffic monitoring), a latency requirement (e.g., 100ms or ultra-low latency of 0.5ms, data traffic context (e.g., data packet size or data rate), traffic type (e.g., non-IP or IP based); mobility context associated with the UE 2502 (e.g., static, pedestrian, vehicular), a planned scheduled of data transmission from the UE 2502, type of access that can be performed by the UE 2502 (e.g., grant access, grant-less access, or access that switches between grant and grant-less)."



Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRENDA H PHAM whose telephone number is (571)272-3135. The examiner can normally be reached on 571-272-3135.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Jiang can be reached on 571-270-7191. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRENDA H. PHAM
Primary Examiner
Art Unit 2412

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

Notice of References Cited	Application/Control No. 16/346,987	Applicant(s)/Patent Under Reexamination HONG et al.	
	Examiner BRENDA H PHAM	Art Unit 2412	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20180007552-A1	01-2018	Bae; Beomsik	H04W12/04033	1/1
*	B	US-20180124854-A1	05-2018	MYHRE; Elena	H04W76/10	1/1
*	C	US-20160353465-A1	12-2016	VRZIC; Sophie	H04W28/0247	1/1
*	D	US-20170367036-A1	12-2017	Chen; Wei	H04L43/08	1/1
	E					
	F					
	G					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 407 of 522

Notice of References Cited	Application/Control No. 16/346,987	Applicant(s)/Patent Under Reexamination HONG et al.	
	Examiner BRENDA H PHAM	Art Unit 2412	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
	A					
	B					
	C					
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	I					
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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	V	
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 408 of 522

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	482	(slice same request$4 same (base adj station))	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:31
L2	44	((slice near request$4) same (base adj station))	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:33
L3	193	1 and @ad<="20171030"	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2020/10/06 17:33
L4	9	(("20180007552") or ("10735956") or ("20190357131") or ("20180007552") or ("20180352501") or ("20180041904") or ("20180310238") or ("20170206115") or ("20160353465") or ("20170367036")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2020/10/06 18:07
L5	9	4 and (slice same request$4)	US-PGPUB; USPAT; USOCR	OR	ON	2020/10/06 18:08

10/6/2020 6:38:22 PM
C:\Users\bpham\Documents\EAST\Workspaces\15535472.wsp

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	
Examiner Name	
Attorney Docket Number	811.0180

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20180139660	A1	2018-05-17	Stefan Rommer et al.	
	2	20140198768	A1	2014-07-17	Gene Beck HAHN et al.	
	3	20140199982	A1	2014-07-17	Gene Beck HAHN et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2016/162480	WO	A1	2016-10-13	TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)		X

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.H.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	
	Examiner Name	
	Attorney Docket Number	811.0180

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	ERICSSON, "Solution for selection of a network slice instance", S2-161480, SA WG2 Meeting #114, 11-15 April 2016, Sophia Antipolis, pp. 1-4	X
	2	QUALCOMM INCORPORATED, "Solution for key issue 1 on Network Slicing: Network Slice and Network Functions Selection based on evolved eDECOR model", S2-162339, SA WG2 Meeting #115, 23 - 27 May 2016, Nanjing, P.R. China, pp. 1-7	☒
	3	SAMSUNG, "Solution for Network Slice Selection based on the NG UE's service context", S2-162622, SA WG2 Meeting #115, 23 - 27 May 2016, Nanjing, P.R. China, pp. 1-4	☒

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/BRENDA H PHAM/ (04/06/2020)	Date Considered	04/06/2020

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.H.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	
	Examiner Name	
	Attorney Docket Number	811.0180

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Ian M. Hughes/	Date (YYYY-MM-DD)	2019-05-02
Name/Print	Ian M. Hughes	Registration Number	41083

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
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Page 413 of 522

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	811.0180	4995

76277 7590 11/20/2020

IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

EXAMINER
PHAM, BRENDA H

ART UNIT	PAPER NUMBER
2412	

NOTIFICATION DATE	DELIVERY MODE
11/20/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

email@iplsllc.com

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U.S. Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450

APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR/ PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
16/346,987	05/02/2019	HONG et al.	811.0180

		EXAMINER	
IP LEGAL SERVICES, LLC P.O. Box 651325 Sterling, VA 20165		BRENDA H PHAM	
		ART UNIT	PAPER
		2412	20201117

DATE MAILED: _____

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

The attached Detailed Action is for replace the office action mailed on 10/14/2020.

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

PTO-90C (Rev.04-03)

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

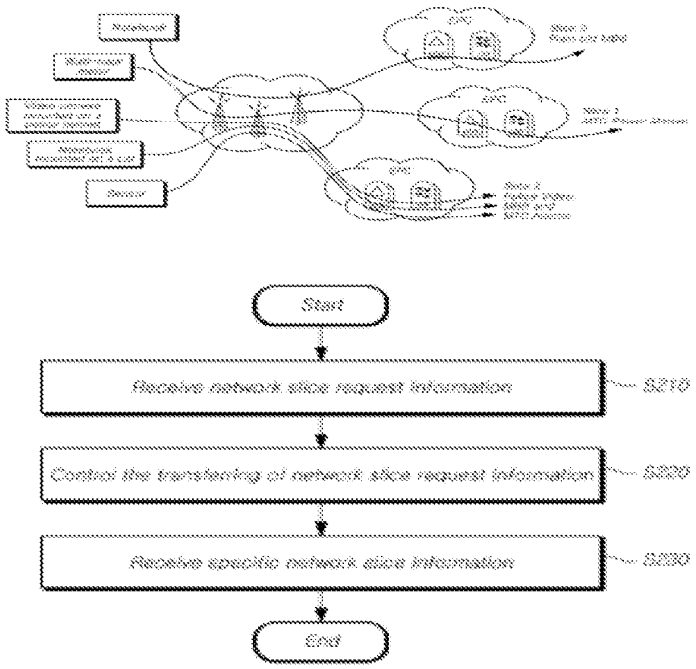
2. Claims 21-39 are pending.

Information Disclosure Statement (IDS)

3. The information disclosure statement (IDS) submitted on June 15, 2020, February 10, 2020 and May 2, 2019 is being considered by the examiner.

4. Figures 1 and of the application are directed to the claimed invention.

FIG. 1



Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case maybe, names another inventor and was effectively filed before the effective filing date of the claimed invention.

6. Claims 21, 23-24, 27, 29-31 and 34 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Bae et al. (US 2018/0007552 A1).

Regarding claims 21, 27 and 31, Bae et al. discloses a User equipment, a base station, a method of a base station for transmitting and receiving data through a network slice, the method comprising:

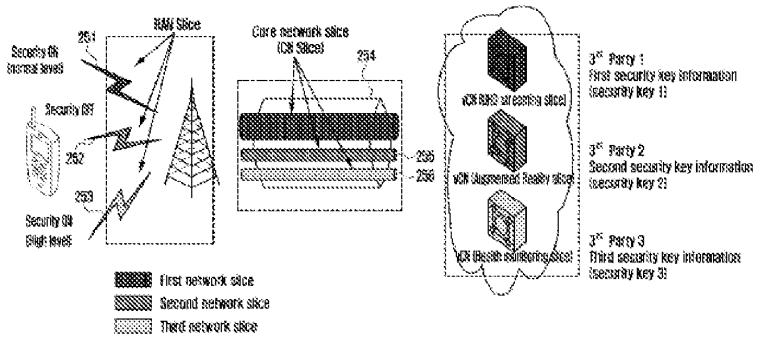
receiving network slice request information from a user equipment (UE) configured with the network slice ([0012]: "a method of a network comprising: receiving connection request messages for network slices, which are networks constructed for each service, from a terminal;");

controlling the network slice request information to be transferred to a core network entity ([0012]: "generating security contexts for each network slice based on at least one of identifiers of the network slices and tokens generated during an authentication process with a third party; and transmitting messages including the security contexts generated for each network slice to the base station."; and

receiving specific network slice information that is configured based on the network slice request information from the core network entity.

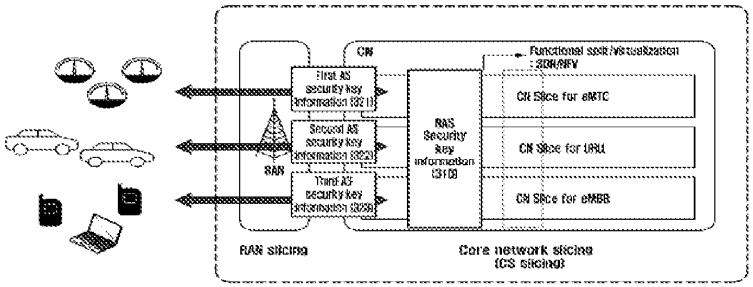
([0132]: "Next, in step S570, the base station may transmit RRC connection reconfiguration message (5G RRC connection reconfiguration) or attach accept message to the terminal as a response to the connection request message of the terminal.

FIG. 2C



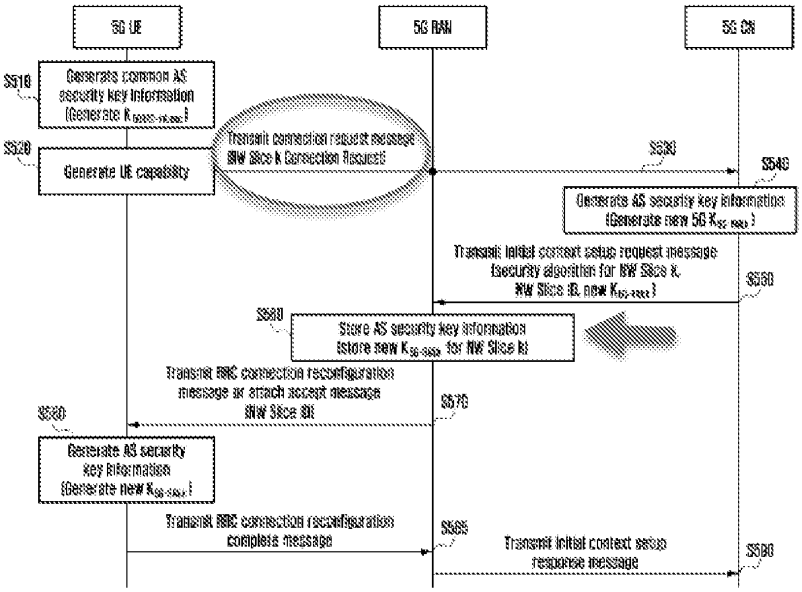
Application Publication Jan. 4, 2018 Sheet 4 of 25 US 2018/0007552

FIG. 3



Regarding claims 23, 29 and 33, Bae et al. discloses the method according to claim 1, **wherein the network slice request information is included in a radio resource control (RRC) connection setup message or NAS message included in the RRC connection setup message.** ([0113]: "the terminal may use the NAS security key information to generate common AS security key information 450 K.sub.5G-RAN. The common AS security key may refer to a security key, which is commonly applied, to support one RRC connection.")

FIG. 5

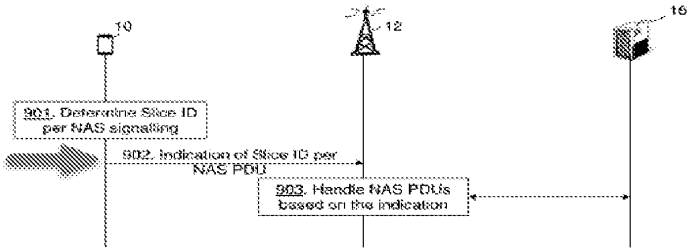


Regarding claims 24, 30 and 34, Bae et al. discloses the method of claim 1, **wherein the specific network slice information specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.** ([0016]: "a controller receiving a setup request message including a generated security context from a network based on at least one of identifier of network slices which are networks constructed for each service and tokens generated during an authentication process with a third party.")

7. Claims 21-24, 27-31, 33-34 are rejected under 35 U.S.C. 102(a)(2) as being anticipated by MYHRE et al. (US 2018/0124854 A1).

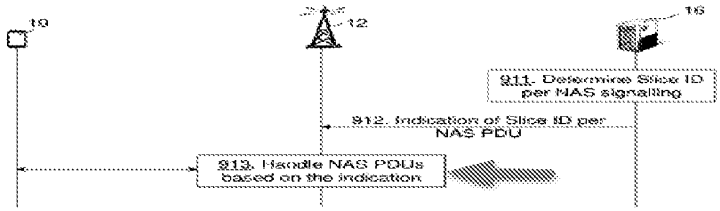
Regarding claims 21, 27 and 31, MYHRE et al. discloses a User equipment, a base station, a method of a base station for transmitting and receiving data through a network slice, the method comprising:

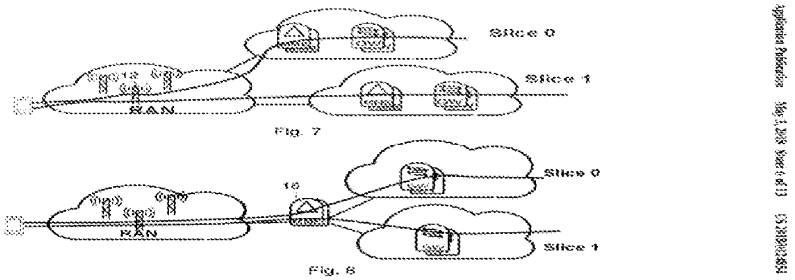
receiving network slice request information from a user equipment (UE) configured with the network slice;



controlling the network slice request information to be transferred to a core network entity (903 "Handle NAS PDUs based on the indication"); and

receiving specific network slice information that is configured based on the network slice request information from the core network entity. See figures 9a, 9b.





Regarding claims 22, 28, 32 and 38 MYHRE et al. discloses the method according to claim 1, **wherein the user equipment is configured with one or more network**

slices, and one network slice is associated with one protocol data unit (PDU) session. ([0059]: "The receiving communication device is configured to receive from a transmitting communication device, a NAS PDU and an indication over a signaling connection carrying NAS PDUs.")

Regarding claims 23, 29 and 33, MYHRE et al. discloses the method of claim 1, **wherein the network slice request information is included in a radio control RRC connection setup message or NAS message included in the RRC connection setup message.** ([0119]: "[0121] When the UE context is created in the radio network node 12, the core network node 16 may provide information in the S1AP INITIAL CONTEXT SETUP REQUEST message. In one example this consists of the core network node 16 indicating a network slice information in this message and the radio network node 12 can use the network slice information to select for example a related priority level for NAS signaling for this UE context."); ([0100]: "Action 902. The wireless device 10 then adds information, the indication, to a message e.g., an RRC message, which indication indicates the association between the NAS PDU and the first network slice.")

Regarding claims 24, 30 and 34, MYHRE et al. discloses the method of claim 1, **wherein the specific network slice information specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.** ([0119]: "[0121]: "When the UE context is created in the radio network node 12, the core network node 16 may provide information in the S1AP INITIAL CONTEXT SETUP REQUEST message. In one

example this consists of the core network node 16 indicating a network slice information in this message and the radio network node 12 can use the network slice information to select for example a related priority level of NAS signaling for this UE context.")

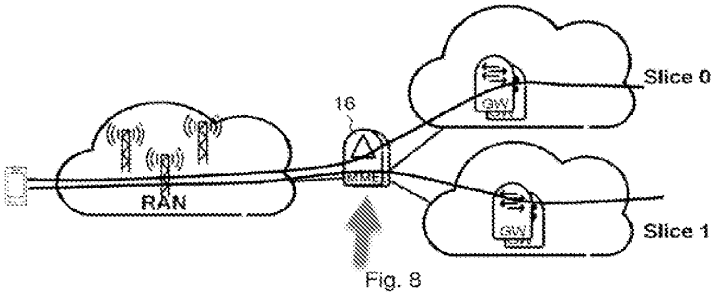
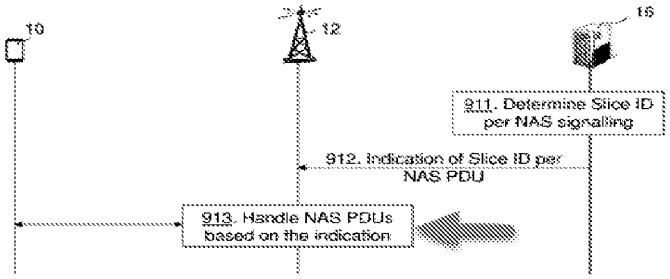


Fig. 8



Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 22, 28, 32 and 25-26 35-36 and 39 are rejected under 35 U.S.C. 103 as being unpatentable over Bae et al. (US 2018/0007552 A1) in view of VRZIC et al. (US 2016/0353465 A1).

Regarding claims 22, 28, 32 and 39, although Bae et al. do not explicitly disclose **wherein the user equipment is configured with one or more network slice, and one**

network slice is associated with one protocol data unit (PDU) session, it is inherently implementing in Bae et al. one network slice associated with one protocol data unit (PDU) session.

In an alternative, VRZIC et al. in the same field of invention, discloses ([0041]: "network slicing allows the instantiation of separate network slices respectively directed toward different network services. This allows for separation of different types of traffic, the different types of traffic potentially having different packet processing requirement and QoS requirements. Network slicing may correspond to the allocation of pooled resources to offer different services to different customers or groups of customers, such that different services are supported by different customized virtual networks, where the different customize virtual networks are substantially separate from one another from the customer's point of view."

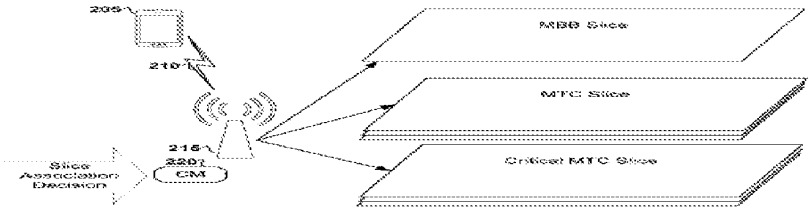


FIG. 2B

Therefore, it would have been obvious to those having ordinary skill in the art before the effective filing date of the claimed invention to combine VRZIC et al. with Bae et al. for process different QoS packets.

Regarding claims 25-26 35-36, VRZIC et al. further discloses the method of claim 1, further comprises, **after the specific network slice information has been received from the core network entity, transmitting the specific network slice information to**

a target station. ("send an inter-operator handover request to the G-CSM, or send an inter-operator handover request to a target G-CMM"...This may assist in providing an seamless or near-seamless slice handover."

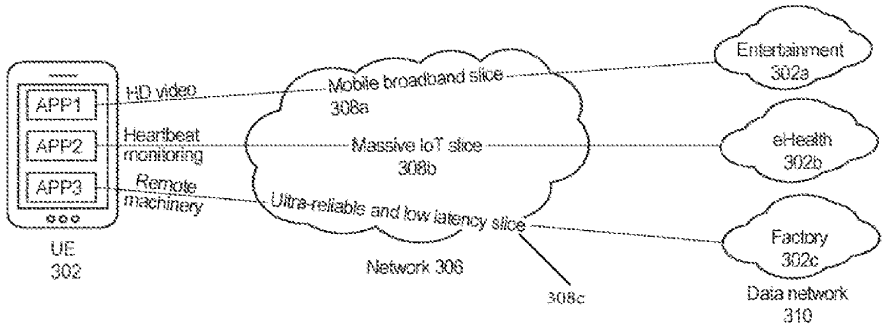
Therefore, it would have been obvious to those having ordinary skill in the art before the effective filing date of the claimed invention to combine VRZIC with Bae et al.

Allowable Subject Matter

10. Claims 37 and 38 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The prior art made of record and not relied upon is considered pertinent to application disclosure:

Chen et al. (US 2017/0367036 A1) discloses network slice discovery and selection. [0040]: "The request may be a request for access to a network or UE selected RAN slice 2510 at the NR-node 2504. The request may include various context information associated with the UE 2502. The context information may include, for example and without limitation, a device type (e.g., mMTC, URLLS) of the UE 2502, a service associated with the UE 2502 (e.g., forest first monitoring or traffic monitoring), a latency requirement (e.g., 100ms or ultra-low latency of 0.5ms, data traffic context (e.g., data packet size or data rate), traffic type (e.g., non-IP or IP based); mobility context associated with the UE 2502 (e.g., static, pedestrian, vehicular), a planned scheduled of data transmission from the UE 2502, type of access that can be performed by the UE 2502 (e.g., grant access, grant-less access, or access that switches between grant and grant-less)."



Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRENDA H PHAM whose telephone number is (571)272-3135. The examiner can normally be reached on 571-272-3135.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Jiang can be reached on 571-270-7191. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRENDA H. PHAM
Primary Examiner
Art Unit 2412

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

REMARKS

Applicant appreciates the Examiner's review of the present application and respectfully requests reconsideration in view of the foregoing amendments and the following remarks.

Claims Amendments/Status

Claims 21 to 39 were previously pending in the application. Claims 21, 26, 27, 31, 36, and 38 are amended. Claims 25, 35, and 37 are canceled without prejudice and disclaimer. Applicant respectfully submits that no new matter is added and the support for the statements herein may be found throughout the specification as originally filed.

35 U.S.C. §102(a) and §103(a)

Claims 21, 23-24, 27, 29-31, and 34 are rejected under 35 U.S.C. §102(a)(2) as being anticipated by U.S. Patent Application Publication No. 2018/0007552 to Bae et al. (hereinafter "*Bae*"). Claims 21-24, 27-31, and 33-34 are rejected under 35 U.S.C. §102(a)(2) as being anticipated by U.S. Patent Application Publication No. 2018/0124854 to MYHRE et al. (hereinafter "*Myhre*"). Claims 22, 28, 32, 25-26, 35-36, and 39 are rejected under 35 U.S.C. §103 as being unpatentable over *Bae* in view of U.S. Patent Application Publication No. 2016/0353465 to VRZIC et al. (hereinafter "*Vrzic*").

Claims 21, 27, and 31 are amended to include the allowable subject matter of claim 37 and intervening claims 25 and 35, respectively. Claims 22-24, 26, 28-30, 32-34, 36, and 38-39, which are directly or indirectly dependent one of independent claims 21, 27, and 31, are also allowable over the art of record.

Accordingly, Applicant respectfully request that the rejection of the claims under 35 U.S.C. §102(a) and §103(a) be withdrawn.

Allowable Claims

Claims 37 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitation of the base claim and any intervening claims.

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Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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As discussed above, the allowable subject matters of claim 37 and intervening claim 25 are included in independent claims 21, 27, and 31. Accordingly, claims 25, 35, and 37 are canceled. Therefore, the objections to the claims are moot.

Accordingly, withdrawal of these objects is respectfully requested.

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CONCLUSION

Applicant believes that a full and complete response has been made to the Office Action and respectfully submits that all of the stated objections and/or grounds for rejection have been overcome or rendered moot. Accordingly, Applicant respectfully submits that the now-pending claims are in condition for allowance and that the entire application is now in condition for allowance.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact the Applicant's undersigned representative at the number below to expedite prosecution. Prompt and favorable action is respectfully solicited.

Respectfully submitted,

Date: 11 January 2021

/Joung Kook Park/

Customer No. 76277
IP Legal Services, LLC
P.O. Box 651325
Sterling, VA 20165

Joung Kook Park, Reg. No. 69,192
Agent for Applicant
(571) 267-7183 (phone)

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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AMENDMENT TO THE CLAIMS

1-20. (Canceled)

21. (**Currently Amended**) A method of a base station for transmitting and receiving data through a network slice, the method comprising:

receiving a non-access stratum (NAS) message including network slice request information from a user equipment (UE) configured with the network slice;

controlling the network slice request information to be transferred to a core network entity;~~and~~

receiving specific network slice information that is configured based on the network slice request information from the core network entity;

transmitting the specific network slice information which is included in a handover request message to a target base station; and

when a protocol data unit (PDU) session associated with a network slice that the target base station does not support is included in the specific network slice information, receiving a handover request confirmation message including information for indicating the PDU session associated with the network slice not supported by the target base station from the target base station.

22. (Previously Presented) The method according to claim 21, wherein the user equipment is configured with one or more network slices, and one network slice is associated with one protocol data unit (PDU) session.

23. (Previously Presented) The method according to claim 21, wherein the NAS message including the network slice request information is included in a radio resource control (RRC) connection setup completion message.

24. (Previously Presented) The method according to claim 21, wherein the specific network slice information specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.

25. (**Canceled**)

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26. (**Currently Amended**) The method according to ~~claim 25~~ claim 21, wherein the transmitting to the target base station is performed through a direct interface associated with the core network entity or the target base station.

27. (**Currently Amended**) A method of a user equipment (UE) for transmitting and receiving data through a network slice, the method comprising:

configuring the network slice;

transmitting a non-access stratum (NAS) message including network slice request information to a base station; and

receiving, from the base station, a handover command generated based on specific network slice information that a target base station has received from a core network entity or the base station,

wherein the base station transmits the specific network slice information which is included in a handover request message to a target base station; and

when a protocol data unit (PDU) session associated with a network slice that the target base station does not support is included in the specific network slice information, the base station receives a handover request confirmation message including information for indicating the PDU session associated with the network slice not supported by the target base station from the target base station.

28. (Previously Presented) The method according to claim 27, wherein the configuring of the network slice is performed by configuring one or more network slices, and configuring one network slice to be associated with one protocol data unit (PDU) session.

29. (Previously Presented) The method according to claim 27, wherein the NAS message including the network slice request information is included in a radio resource control (RRC) connection setup completion message.

30. (Previously Presented) The method according to claim 27, wherein the base station transfers the network slice request information to the core network entity and receives the specific network slice request information configured based on the network slice request information from

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the core network entity.

31. (**Currently Amended**) A base station for transmitting and receiving data through a network slice, the base station comprising:

a receiver configured to receive a non-access stratum (NAS) message including network slice request information from a user equipment (UE) configured with the network slice; ~~and~~

a controller configured to control the network slice request information to be transferred to a core network entity; and

a transmitter configured to transmit the specific network slice information which is included in a handover request message to the target base station,

wherein the receiver further receives specific network slice information that is configured based on the network slice request information from the core network entity, and

wherein when a protocol data unit (PDU) session associated with a network slice that the target base station does not support is included in the specific network slice information, the receiver receives a handover request confirmation message including information for indicating the PDU session associated with the network slice not supported by the target base station from the target base station.

32. (Previously Presented) The base station according to claim 31, wherein the user equipment is configured with one or more network slices, and one network slice is associated with one protocol data unit (PDU) session.

33. (Previously Presented) The base station according to claim 31, wherein the NAS message including the network slice request information is included in a radio resource control (RRC) connection setup completion message.

34. (Previously Presented) The base station according to claim 31, wherein the specific network slice information is specified by the core network entity based on the network slice request information and subscription information, and received with being included in UE context information.

35. (**Canceled**)

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 432 of 522

36. (**Currently Amended**) The base station according to ~~claim 35~~ claim 31, wherein the transmitter transmits the specific network slice information through a direct interface associated with the core network entity or the target base station.

37. (**Canceled**)

38. (**Currently Amended**) The method according to ~~claim 37~~ claim 21, wherein the handover request confirmation message includes PDU session identification information for indicating the PDU session associated with the network slice not supported by the target base station.

39. (Previously Presented) The method according to claim 21, wherein the network slice request information includes network slice information configured for the user equipment or network slice information allowed for the user equipment.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 433 of 522

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Sung-pyo HONG Re: Attorney Docket No.: 811.0180

Serial No.:	16/346,987	Art Unit:	2412
Filed:	05/02/2019	Examiner:	PHAM, BRENDA H
Matter No.:	811.0180	Conf. No.:	4995

For: METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

REPLY TO OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to **the Non-Final Office action of 10/14/2020, and the Office Action of 11/20/2020,** please reconsider the application in light of the following amendments/remarks.

Applicant believes that no extensions of time and fees are required at this time. However, if extensions of time are necessary to prevent abandonment of this application, such extensions of time are hereby petitioned for under 37 C.F.R. §1.136 (a). The Director is hereby authorized to charge any fees that may be required, or also credit any overpayment, to Deposit Account Number 60-2802.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 434 of 522

Electronic Acknowledgement Receipt

EFS ID:	41608061
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	76277
Filer:	Kyung Hee Kim/yujin Chun
Filer Authorized By:	Kyung Hee Kim
Attorney Docket Number:	811.0180
Receipt Date:	11-JAN-2021
Filing Date:	02-MAY-2019
Time Stamp:	14:05:06
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	8110180ReplytoNFOA.pdf	146188 a2ed669ebb904f9e46f60eacb1be4a78a12a0255	no	8

Warnings:

Information:	
Total Files Size (in bytes):	146188

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

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Application Number	16/346,987
Filing Date	May 2, 2019
First Named Inventor	Sung-pyo HONG
Title	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
Art Unit	2412
Examiner Name	PHAM, BRENDA H
Attorney Docket Number	KT21-0119

SIGNATURE of Applicant or Patent Practitioner

Signature	/Daniel CHUNG/	Date (Optional)	
Name	Daniel CHUNG	Registration Number	57889
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 126667

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	[signature]	Date (Optional)	
Name	Seung-Eun Lee		
Title	Team leader		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Acknowledgement Receipt

EFS ID:	41883982
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	76277
Filer:	Daniel Chung/judy Kim
Filer Authorized By:	Daniel Chung
Attorney Docket Number:	811.0180
Receipt Date:	10-FEB-2021
Filing Date:	02-MAY-2019
Time Stamp:	02:16:42
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	210210-KT21-0119_POA.pdf	564292 34fd9928e1ab2e3bf04678d669b789d37ff581c8	no	2
Warnings:					

Information:	
Total Files Size (in bytes):	564292

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
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New International Application Filed with the USPTO as a Receiving Office
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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/346,987
Filing Date	May 2, 2019
First Named Inventor	Sung-pyo HONG
Title	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
Art Unit	2412
Examiner Name	PHAM, BRENDA H
Attorney Docket Number	KT21-0119

SIGNATURE of Applicant or Patent Practitioner

Signature	/Daniel CHUNG/	Date (Optional)	
Name	Daniel CHUNG	Registration Number	57889
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 126667

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

KT CORPORATION

☐ Inventor or Joint Inventor (title not required below)
☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)
☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)
☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Sang-Kyu Woo		
Title	Team leader, KT CORPORATION		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Acknowledgement Receipt

EFS ID:	41928558
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	76277
Filer:	Daniel Chung/judy Kim
Filer Authorized By:	Daniel Chung
Attorney Docket Number:	811.0180
Receipt Date:	16-FEB-2021
Filing Date:	02-MAY-2019
Time Stamp:	11:20:18
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	210216-KT21-0119_POA.pdf	579163 0f34cab54ebcc16ddc58d1f87c261667c56f64dd	no	2

Warnings:

Information:	
Total Files Size (in bytes):	579163

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New Applications Under 35 U.S.C. 111

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Acknowledgement Receipt

EFS ID:	41951218
Application Number:	16346987
International Application Number:	
Confirmation Number:	4995
Title of Invention:	METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR
First Named Inventor/Applicant Name:	Sung-pyo HONG
Customer Number:	126667
Filer:	Daniel Chung/judy Kim
Filer Authorized By:	Daniel Chung
Attorney Docket Number:	KT21-0119
Receipt Date:	17-FEB-2021
Filing Date:	02-MAY-2019
Time Stamp:	21:04:25
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73	aia0096-KT21-0119.pdf	112793 41c1f8644c1339e3c4b525e611a2e6e331b9f946	no	3

Warnings:

Information:	
Total Files Size (in bytes):	112793

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New Applications Under 35 U.S.C. 111

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PTO/AIA/96 (08-12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Sung-pyo HONG

Application No./Patent No.: 16/346,987 Filed/Issue Date: 05-02-2019

Titled: METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

KT CORPORATION, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 049062, Frame 0933, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Daniel CHUNG/	February 17, 2021
Signature	Date
Daniel CHUNG	57889
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/346,987	05/02/2019	Sung-pyo HONG	KT21-0119

CONFIRMATION NO. 4995

126667
INVENSTONE PATENT, LLC
14291-A Brushwood way
Centreville, VA 20121

POA ACCEPTANCE LETTER

OC000000123460315

Date Mailed: 02/22/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/16/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dgela/

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 450 of 522

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/346,987	05/02/2019	Sung-pyo HONG	811.0180

CONFIRMATION NO. 4995

76277
IP LEGAL SERVICES, LLC
P.O. Box 651325
Sterling, VA 20165

POWER OF ATTORNEY NOTICE

OC000000123460300

Date Mailed: 02/22/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 02/16/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dgela/

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 451 of 522

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	609	(slice same handover)	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:13
L3	98	2 and @ad<="20161103"	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:25
L4	75	(slice same handover).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:54
L5	3,706	(handover and support$4 and slice)	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:55
L6	82	3 and (handover and support$4 and slice)	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:56

2/16/2021 2:57:42 PM
C:\Users\bpham\Documents\EAST\Workspaces\Brenda1.wsp

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/346,987	HONG et al.
	Examiner	Art Unit
	BRENDA H PHAM	2412

CPC - Searched*		
Symbol	Date	Examiner
(H04W76/27.cpc. H04L41/0806.cpc. H04W36/0072.cpc. H04W36/08 .cpc. H04W72/085.cpc. H04W4/70.cpc.)	10/08/2020	b.p.

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
EAST	10/08/2020	b.p.

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	(H04W76/27.cpc. H04L41/0806.cpc. H04W36/0072 .cpc. H04W36/08.cpc. H04W72/085.cpc. H04W4/ 70.cpc.)	02/16/2021	b.p.
	EAST	02/16/2021	b.p.

/BRENDA H PHAM/ Primary Examiner, Art Unit 2412	

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 453 of 522

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	609	(slice same handover)	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:13
L3	98	2 and @ad<="20161103"	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:25
L4	75	(slice same handover).clm.	US-PGPUB; USPAT; USOCR; EPO; DERWENT; IBM_TDB	OR	ON	2021/02/16 14:54

2/16/2021 2:55:01 PM
C:\Users\bpham\Documents\EAST\Workspaces\Brenda1.wsp

Notice of References Cited	Application/Control No. 16/346,987	Applicant(s)/Patent Under Reexamination HONG et al.	
	Examiner BRENDA H PHAM	Art Unit 2412	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20200305054-A1	09-2020	ZEE; Oscar	H04W76/30	1/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 455 of 522

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/346,987	HONG et al.
	Examiner	**Art Unit**
	BRENDA H PHAM	2412

CPC						
Symbol					**Type**	**Version**
H04W	/	76	/	27	F	2018-02-01
H04L	/	41	/	0806	I	2013-01-01
H04W	/	36	/	0072	I	2013-01-01
H04W	/	36	/	08	I	2013-01-01
H04W	/	72	/	085	I	2013-01-01
H04W	/	4	/	70	A	2018-02-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/BRENDA H PHAM/ Primary Examiner, Art Unit 2412	16 February 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	21	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210216

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 456 of 522

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/346,987	HONG et al.
	Examiner	Art Unit
	BRENDA H PHAM	2412

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04W	/	76	/	27
NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/BRENDA H PHAM/ Primary Examiner, Art Unit 2412	16 February 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	21	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210216

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/346,987	HONG et al.
	Examiner	Art Unit
	BRENDA H PHAM	2412

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	21	10	29												
2	22	11	30												
3	23	12	31												
4	24	13	32												
5	26	14	33												
6	38	15	34												
7	39	16	36												
8	27														
9	28														

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	16	
/BRENDA H PHAM/ Primary Examiner, Art Unit 2412	16 February 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	21	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210216

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

126667 7590 02/24/2021
INVENSTONE PATENT, LLC
14291-A Brushwood way
Centreville, VA 20121

EXAMINER
PHAM, BRENDA H

ART UNIT	PAPER NUMBER
2412	

DATE MAILED: 02/24/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	KT21-0119	4995

TITLE OF INVENTION: METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/24/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 459 of 522

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

126667 7590 02/24/2021
INVENSTONE PATENT, LLC
14291-A Brushwood way
Centreville, VA 20121

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	KT21-0119	4995

TITLE OF INVENTION: METHOD FOR PROCESSING DATA ON BASIS OF NETWORK SLICE, AND APPARATUS THEREFOR

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	05/24/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAM, BRENDA H	2412	370-254000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 460 of 522

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	KT21-0119	4995

126667 7590 02/24/2021

INVENSTONE PATENT, LLC
14291-A Brushwood way
Centreville, VA 20121

EXAMINER	
PHAM, BRENDA H	
ART UNIT	**PAPER NUMBER**
2412	

DATE MAILED: 02/24/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 461 of 522

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	**Application No.** 16/346,987	**Applicant(s)** HONG et al.	
	Examiner BRENDA H PHAM	**Art Unit** 2412	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to January 11, 2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are See Continuation Sheet . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☑ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 463 of 522

Continuation of 3. The allowed claim(s) is/are: 21-24, 26, 38-39, 27-34 and 36, renumbering as 1-16, respectively

REASONS FOR ALLOWANCE

1. The following is an examiner's statement of reasons for allowance:

ZEE et al. (US 2020/0305054 A1) discloses a method of a base station for transmitting and receiving data through a network slice, the method comprising: receiving a non-access stratum (NAS) message including network slice request information from a user equipment (UE) configured with the network slice; controlling the network slice request information to be transferred to a core network entity; receiving specific network slice information that is configured based on the network slice request information from the core network entity.

ZEE et al. fails to disclose transmitting the specific network slice information which is included in a handover request message to a target base station; and when a protocol data unit (PDU) session associated with a network slice that the target base station does not support is included in the specific network slice information, receiving a handover request confirmation message including information for indicating the PDU session associated with the network slice not supported by the target base station from the target base station.

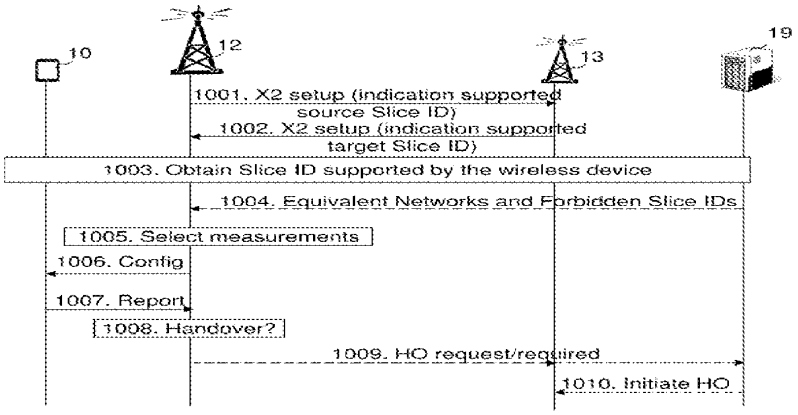
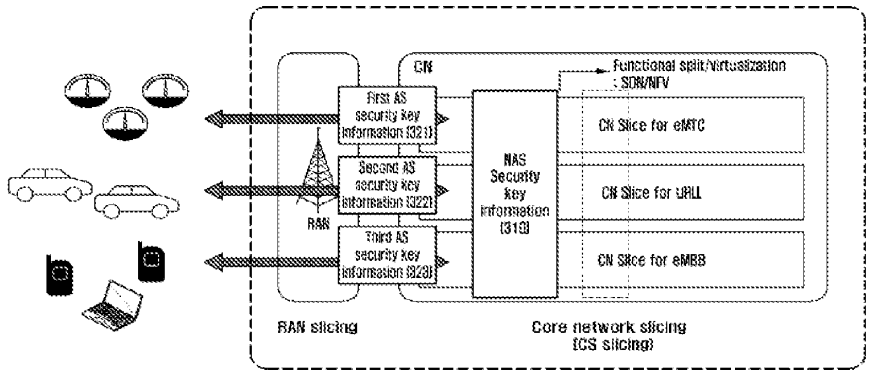


Fig. 10

Patent Application Publication Sep. 24, 2020 Sheet 10 of 19 US 2020/0305054 A

Bae et al. (US 2018/0007552 A1) discloses a User equipment, a base station, a method of a base station for transmitting and receiving data through a network slice, the method comprising: **receiving network slice request information from a user equipment (UE) configured with the network slice** ([0012]: "a method of a network comprising: receiving connection request messages for network slices, which are networks constructed for each service, from a terminal;"); **controlling the network slice request information to be transferred to a core network entity** ([0012]: "generating security contexts for each network slice based on at least one of identifiers of the network slices and tokens generated during an authentication process with a third party; **and transmitting messages including the security contexts generated for each network slice to the base station; and receiving specific network slice information that is configured based on the network slice request information from the core network entity** ([0132]: "Next, in step S570, the base station may transmit RRC connection reconfiguration message (5G RRC connection reconfiguration) or attach accept message to the terminal as a response to the connection request message of the terminal.

Bae et al. fails to disclose transmitting the specific network slice information which is included in a handover request message to a target base station; and when a protocol data unit (PDU) session associated with a network slice that the target base station does not support is included in the specific network slice information, receiving a handover request confirmation message including information for indicating the PDU session associated with the network slice not supported by the target base station from the target base station.



cation Publication Jan. 4, 2018 Sheet 5 of 25 US 2018/0007552

2. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRENDA H PHAM whose telephone number is (571)272-3135. The examiner can normally be reached on 571-272-3135.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Jiang can be reached on 571-270-7191. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRENDA H. PHAM
Primary Examiner
Art Unit 2412

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/346,987	05/02/2019	Sung-pyo HONG	KT21-0119	4995

126667 7590 03/12/2021

INVENSTONE PATENT, LLC
14291-A Brushwood way
Centreville, VA 20121

EXAMINER
PHAM, BRENDA H

ART UNIT	PAPER NUMBER
2412	

NOTIFICATION DATE	DELIVERY MODE
03/12/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dan@invenstonepat.com
mail@invenstonepat.com

Notice of Allowability	**Application No.** 16/346,987	**Applicant(s)** HONG et al.	
	Examiner BRENDA H PHAM	**Art Unit** 2412	**AIA (FITF) Status** Yes

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   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

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4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
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7. ☐ Other _____.

/BRENDA H PHAM/
Primary Examiner, Art Unit 2412

Petitioners' Exhibit 1010
Nokia of America Corp., et al. v. KT Corporation, et al.
Case No. IPR2025-00036; U.S. Patent No. 11,627,631
Page 470 of 522

Continuation of 3. The allowed claim(s) is/are: 21-24, 26, 38-39, 27-34 adn 36, renumbering as 1-16, respectively

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	16346987
Filing Date	2019-05-02
First Named Inventor	Sung-pyo HONG
Art Unit	2412
Examiner Name	PHAM, BRENDA H
Attorney Docket Number	811.0180

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.H.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16346987
	Filing Date	2019-05-02
	First Named Inventor	Sung-pyo HONG
	Art Unit	2412
	Examiner Name	PHAM, BRENDA H
	Attorney Docket Number	811.0180

	1	HUAWEI, "Solution for Selection of Network Slice and CN entity", R3-162594, 3GPP TSG-RAN WG3 Meeting #93bis, Sophia Antipolis, France, 10 – 14 October 2016	☒
	2	HUAWEI et al., "RRC support for network slicing", R2-163595, 3GPP TSG-RAN WG2 Meeting #94, Nanjing, China, 23 – 27 May, 2016	☒
	3	EUROPEAN PATENT OFFICE, European Search Report of corresponding EP Patent Application No. 17867340.6, May 12, 2020	☒

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EXAMINER SIGNATURE

Examiner Signature	/BRENDA H PHAM/ (03/09/2021)	Date Considered	03/09/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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