**Telecommunications and Information Exchange Between Systems**

# ISO/IEC JTC 1/SC 6

| | |
|---|---|
| **Document Number:** | N14121 |
| **Date:** | 2009-10-27 |
| **Replaces:** | |
| **Document Type:** | Other document (Defined) |
| **Document Title:** | Korean expert's contribution on the Naming and Addressing Scheme (NAS) for Future Networks |
| **Document Source:** | Korean expert |
| **Project Number:** | |
| **Document Status:** | For discussion at the SC 6/WG 7 Barcelona meeting. |
| **Action ID:** | FYI |
| **Due Date:** | |
| **No. of Pages:** | 6 |
| ISO/IEC JTC1/SC6 Secretariat Ms. Jooran Lee, KSA (on behalf of KATS) <br><br> Korea Technology Center #701-7 Yeoksam-dong, Gangnam-gu, Seoul, 135-513, Republic of Korea ; <br><br> Telephone: +82 2 6009 4808 ;   Facsimile:   +82 2 6009 4819 ;   Email : jooran@kisi.or.kr | |

**Telecommunications and Information Exchange Between Systems**
**ISO/IEC JTC 1/SC6**

| | |
|---|---|
| **Date:** | **2009-10-18** |
| **Documents Type:** | |
| **Document Title:** | **Korean expert's contribution on the Naming and** |
| **Addressing Scheme** | **(NAS) for Future Networks.** |
| **Document source:** | **Korean Experts** |
| **Project Number:** | |
| **Document Status:** | **For discussion at the SC6/WG 7 Barcelona meeting** |
| **Action ID:** | |
| **Due Date:** | |
| **No. of Pages:** | **5** |

# A Geographic Addressing Scheme for wireless networks

Sujin Lee, Hyun-Kook Kahng

## 1. Introduction

According to the 6N14018, the work scope and directions of the Future Network Naming and Addressing Scheme (FN-NAS) is considered. It is believed that the future network should integrate current well-known and widely-deployed technologies. Unlike current network, the wireless network will not be a simple access network anymore in the future network. Here we propose one of candidates how a new addressing scheme for wireless network, adopting GPS service.

Various location-based services which provide Internet services by using location information of objects have been widely disseminated due to the development of wireless communication infrastructures and wired/wireless Internet. Especially, development of mobile communication technologies makes location-based services more noticeable and more important. In addition, the location-based services have been extending to ubiquitous environment and developers related the services work toward to deploy more global service infrastructure by integrating wireless mobile networks and Internet.

Wireless Mesh Network has been become prominent as an alternative infrastructure which can be applicable to particular situations such as areas and environments to be difficult to deploy existing infrastructure. And Mesh Network can deploy reliable network with multiple routes and extend the limited coverage of conventional wireless service from one-hop access point to wider area. Also, Mesh Network allows global wireless LAN to deploy simpler and more economical. Therefore, Mesh Networks have been utilized as a basic infrastructure providing ubiquitous services in various application areas such as ubiquitous sensor network (USN), home networking, etc. However, as network coverage increases, overhead for self discovery, configuration and self healing in Mesh Network increase. So, we should consider problem related network scalability should be considered and seek the solution.

This paper defines a new location-based geographic address scheme that describes location information of node. Purpose of this paper is that a new geographic addressing scheme meets design goals of future network as scalability, heterogeneity, mobility, etc. According to the new location-based geographic address scheme, appropriate geographic routing algorithms and

tracking methods of mobility nodes will be introduced.

## 2. A New Geographic Addressing Scheme

### 2.1 necessity of a new geographic addressing scheme

Recently, Mesh Network technologies have been used to deploy private network for public services. Also, Mesh Network combines with USN(Ubiquitous Sensor Network) which realize ubiquitous environment using many ubiquitous sensor nodes with sensing, processing, and wireless communication capabilities. As a next IP version, IPv6 is developed to improve limitation of IPv4 such as insufficient IP address, inefficient routing, problem of security and mobility supporting, etc. However, IPv6 does not consider geographical concept in addressing scheme.

To provide some location-based ubiquitous services to nodes in global network, a global geographic addressing scheme which can consistently and efficiently represent location information of nodes is required. The representation of consistent location information of global location-based addressing scheme helps deploy a common infrastructure integrating various heterogeneous networks. Also, routing schemes utilize location information for scalable wireless network. Therefore, the new geographic addressing scheme can help improve performance by reducing additional overhead or procedure in location-based routing schemes.

### 2.2 Scope

A new geographic addressing scheme can be applied in Wireless Mesh Network(private networks) communicating with fixed or mobile nodes with multiple routes. When a node(source) in Mesh Network communicates with a node in Internet, a geographic address can be translated global IP address to be able to communicate globally.

### 2.3 Geographic Address Format

A Geographic address defines physical and logical information to globally present. As the geographic address considers compatibility of IPv6 address, the address is 128bits long. Location information should be able to be represented according to goal of services. Therefore, some option to represent additional location information may be used in next header of IPv6.

A new geographic address format is as following.

| Geographic address prefix (16 bit) | Location information (64bit) | ID (48bit) |
|---|---|---|

- Geographic address prefix: address identifier whether geographic address or not
- Location information: representation of latitude, longitude, altitude. Physical information of a node.
- ID: logical information of a node. MAC address may be included.

## 2.3 problem of the geographic address

Because nodes in Mesh network can move, physical location of the nodes can be changed frequently. Therefore, the addresses can be changed frequently when nodes with mobility has geographic addresses. However, due to the frequent changed address, communication may be impossible.

## 2.4 solution of the problem

To not change a geographic address, location information field includes not a node, itself but a specific area. Therefore, data packet to a node can be forwarded to a specific area using location-based routing schemes, and the data packet from specific area can be forwarded using topology-based routing schemes. If physical location information of a node is required, additional information can be described in next header of IPv6.

When a node moves and the node is closer another specific area than existing area of location information field, geographic address can be changed. If a geographic address is changed, some procedure like mobile IP is performed to communicate with nodes continuously.

## 3. Interconnection of Internet

Nodes in Mesh Network can communicate with Internet by translating from geographic addresses into global IP addresses. Interconnection of Internet and Mesh Network is similar procedure of NAT66.

When gateway receives data packet from the node in internal network, gateway creates global IPv6 address for the node using gateway's external prefix, ID field of geographic address of the node and etc. Then gateway forward the data packet including translated IP address to external network and maintains pairs of the geographic address and global IPv6 address of the node in mapping table.

Internal address - geographic address

**Wireless network**

Gateway

Mapping Table

External address - global IPv6 address

**Internet**