

**Ubiquitous Network**  
**- A Brave New Communication World -**  
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**1. Concept of ubiquitous network**

The Internet appearing early in 1990s provided us with a lot of easily accessible digital data or information on the network, assuming that we have much talent for personal computers as well as network operations. This is one of the major causes of “digital divide.” The next generation should provide users with a better service without assuming them to have any kind of network skills.

A term “ubiquitous computing” is proposed by M. Wisner in early 1990s to express future distributed computing environment to support a user. This concept is also known as “pervasive computing” or “invisible computing.” We call the background network to support ubiquitous computing as “ubiquitous network.” Under the ubiquitous network, users can enjoy network services whenever and wherever they want (home, office, outdoors, etc).

**2. Background and assumptions**

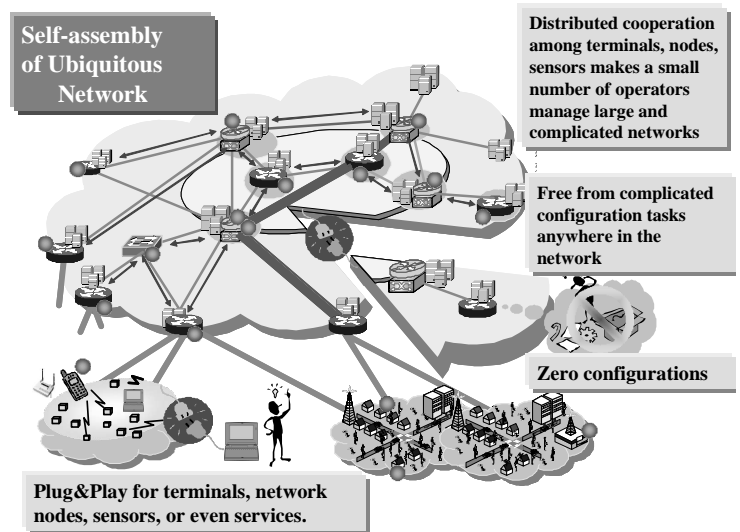
Third generation cellular system is becoming dominant, and person-to-person call is mostly made by cellular. As for home environments, fixed broadband services based on ADSL, FTTH, etc. are going to be widely deployed. This makes users now enjoy broadband access at home as well as in office. The new trends such as information appliance, ITS (Intelligent Transport System), etc. can be considered as the first step toward the era when not only person-to-person communications, but also other communications such as machine-to-machine communications are popular.

Users’ expectation toward these next generation services is not just to be provided with a wider bandwidth. They would rather expect to maintain or enhance their overall living environments, such as safety, security, amenity and feeling ease with the surrounding environments or within their community, where they even will not be aware which communication method they are using.

**3. The role of ubiquitous network**

The role of ubiquitous network should seek for fulfilling such user needs in corporation with user terminals and service platforms. The first keyword is “context awareness” for a user. Context means user's general situation such as user's location, user's access status, etc. By always keeping aware of user’s context, a system can offer the best service that he/she wants or has to be provided. This means not only enhancing users’ terminal capabilities, but also restricting them according to the policies of his/her current environments.

The second keyword is “zero administration” for users as well as operators. Since there might be billions of objects, such as mobile terminals, various sensors, computers, appliances, etc., connected to ubiquitous network, the reduction of operational cost of the entire network as well as end-user terminals is very important. These operational costs will hopefully be null. This is what zero administration means.



**4. Enablers**

The following items are several possible enablers for ubiquitous networking paradigm;

- (1) Advent of high-end mobile terminals which support GPS (Global Positioning System) locator-equipped middleware environment with 3G capability, etc.
- (2) RFID and sensor technology with which man-to-environment interactions are much easier
- (3) Ontology which deals with objects on the Web in more semantic way than ever
- (4) Large address space technologies such as IPv6 for terminal or object identifiers

**5. Flexible service platform is the key**

From the ubiquitous service point of view, a ubiquitous network should have;

- Flexible service platform execution environment with common API,
- Super high performance switching and routing capability,
- Broadband service capability,
- QoS and relevant adaptive routing mechanism.

**6. Conclusion**

Ubiquitous network is a federation of networks on which user oriented services are provided anywhere and anytime to a target user in the most appropriate way. This service provision paradigm is a strong driving force to the next generation network. NGN has an important edge towards the realization of ubiquitous network in the fixed and FMC network area.

The research items described in this paper are mainly coming from the governmental project driven by MPHPT (The Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan), in which KDDI has been working for since 2003. KDDI has made the related presentations in Ubiquitous Networking Forum (<http://www.ubiquitous-forum.jp/>), started from 2002.