N-Screen Service Platform based on Location-Awareness

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Abstract—**We propose a location-aware multimedia delivery platform for N-Screen service. Our architecture allows the content providers to enable consistent LBS and seamless multimedia service for adaptive source multi device (ASMU).**

Keywords- LBS; N-Screen; Multimedia delivery platform

I. INTRODUCTION

Location Based Services (LBS) can reach useful and convenience lifestyle of users. As the advance of wireless network technologies and the accuracy of the location/positioning technologies accelerate, many LBS will appear to be realizing more efficient and reliable services. Recently, multimedia service has become one of popular applications, which users take advantage of spare time at a smart home/hotspot, as smart home/hotspot services plays an important role in providing entertainment for the user. Therefore, smart home users require supporting mobility of multimedia service because it needs to be served seamlessly at any place [1].

With extensive use of smart phones and with development of smart television, the necessity for the seamless display among various devices, so called 'N-Screen', becomes apparent [2]. N-Screen service can be perceived as the essential multimedia service by providing one-source multi-use (OSMU). Seamless N-Screen services are an emerging killer application in personal wireless devices. Seamless services in the heterogeneous networks require smooth automation person by person. In order to provide intelligent services, we manage location of the mobile user. By location information, the proposed platform makes adaptively modifying the multimedia contents according to heterogeneous networks as well as devices.

We propose a location-aware multimedia platform for N-Screen service. Our architecture allows the content providers to enable seamless multimedia service with location-awareness for adaptive-source multi-device (ASMD).

The rest of the paper is organized as follows. In the section 2, we describe related works on seamless multimedia services. In section 3, we propose a location-aware multimedia platform for N-Screen service. The section 4 concludes the paper.

II. RELATED WORKS ON SEAMLESS MULTIMEDIA SERVICES

There have been researches related to seamless multimedia services. Content adaptation framework for Heterogeneous Devices utilizes information about devices, network, interaction, social activities and users in order to adapt digital content and SNS activities [3]. Functional architecture and mechanism for mobile station to provide seamless multimedia services offer continuous and bandwidth-adaptive IPTV service while switching the mobile terminals [4]. Method models for the multimedia service adapt the interfaces and interaction processes of heterogeneous devices [5]. A multimedia service platform includes session mobility management and adaptive streaming to manage video streaming sessions on heterogeneous networks and devices [14].

N-screen is a technology aimed to provide seamless computing environment by supporting synchronized data or program or display [2]. Classification of N-Screen service introduces various kinds of N-screen service scenarios and technologies based on overall scenario model [6]. One of N-Screen deals with token-sharing mechanism among media for guarantying synchronization and continuity of playing contents [7]. Another is new control architecture of group communication that delivers contents to available devices added or deleted dynamically by users in N-Screen service architecture [8]. Some of them are at the level of automated data synchronization such as Dropbox [9], uCloud [10], and others are focusing on ceaseless displaying covering from mobile device to personal computer and television [11].

Several studies have been made on context/location-aware service that can be considered as the decisive application by accomplishing the pervasive intelligence. Context-aware middleware provide an automatic service based on a user's preference inside a smart home [12]. A flexible context-sensitive user profile model gathers static and dynamic data characterizing the user and his operational context in order that Services, especially the multimedia ones, must perform automatically actions/operations to adapt the delivered content to the user expectations and his environment capabilities [13]. A context-aware scalable media delivery for heterogeneous devices has shown good context-aware use cases with video streaming for best possible quality under the constraints of client device capability, network conditions [15].
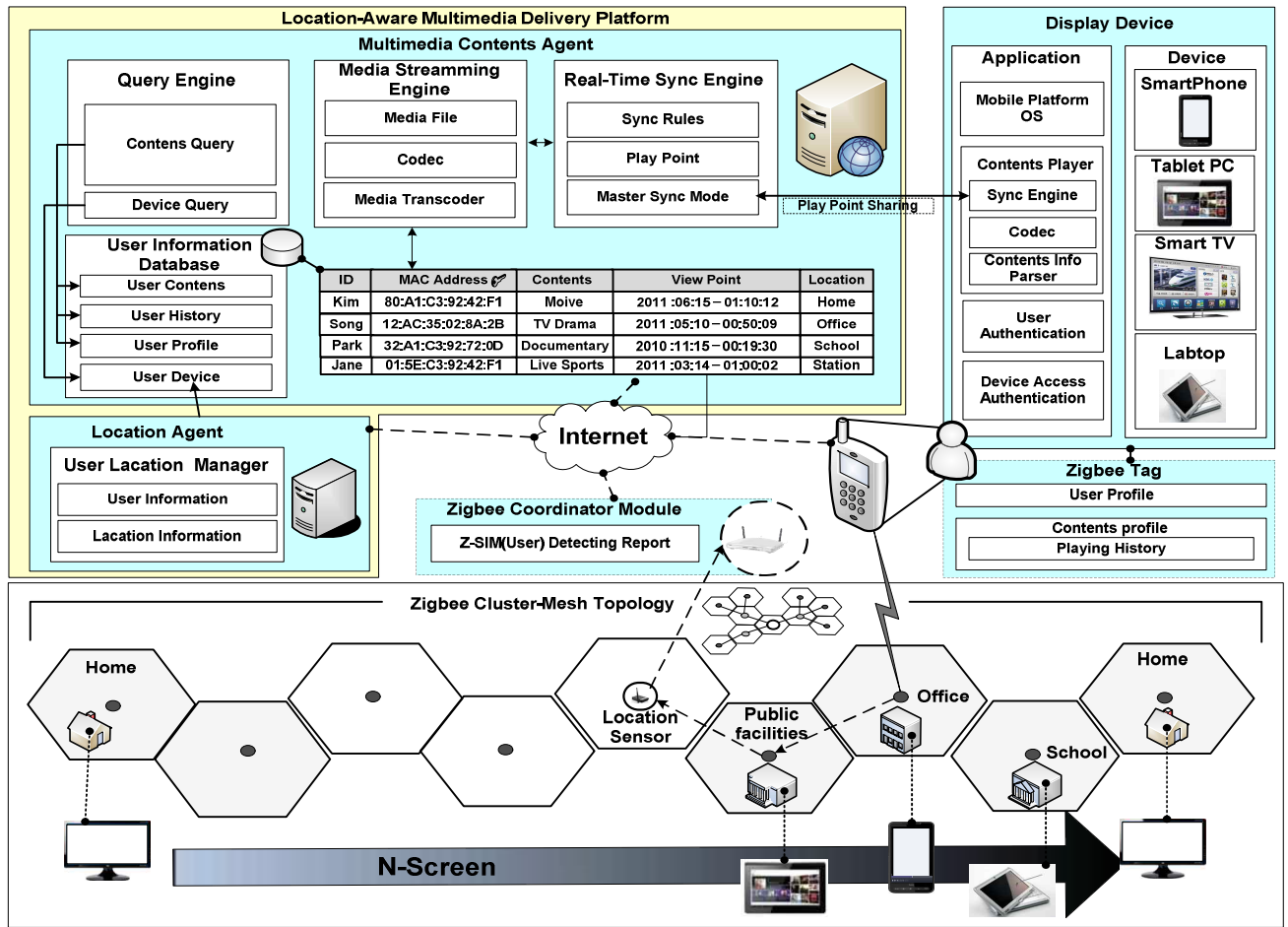
Figure 1. Location-aware multimedia delivery platform architecture

Mobile nodes (MNs) for multimedia services must support seamlessly the service roaming in the heterogeneous devices and networks. Our schemes manage user profile information that should be registered and managed by the servers which are located in the remote space. For location-aware intelligent services, we use the location agent with location/position surveillance and tracking in each spot. Location agent play essential role in assigning location aware intelligence in wireless networks. The smart and ubiquitous computing is dynamic providing the wireless access for seamless multimedia service.

III.   LOCATION-AWRE MULTIMEDIA PLATFORM

By location information, we can increase application with the enhanced intelligence by providing seamless services and automatic contents adaptation. For seamless multimedia service, the location information will play an important role in defining context-awareness. In order to provide intelligent services we use smart techniques for location management of the user. The proposed multimedia platform makes autonomously modifying the multimedia contents according to heterogeneous devices as well as networks.

Fig. 1 shows the proposed architecture which consists of several two components - Location Agent and Multimedia Contents Agent. The Multimedia Contents Agent is an agent that administrates various services. It decides proper services with profile information such as the user's preference and the device's type. The Location Agent that is able to detect the accurate location will play the major role. Intuitively, it is clear that successful location detection can lead to fully automated activation of roaming services while minimizing the service latencies. The mobility prediction is possible by validating location history, by the profiles. The widest existing deployments for positioning are WPAN networks based on ZigBee, which is particularly suited for indoor applications, especially at home, in office building. Location Agent and Location Tag support our fine-grained location recognition using wireless networks.
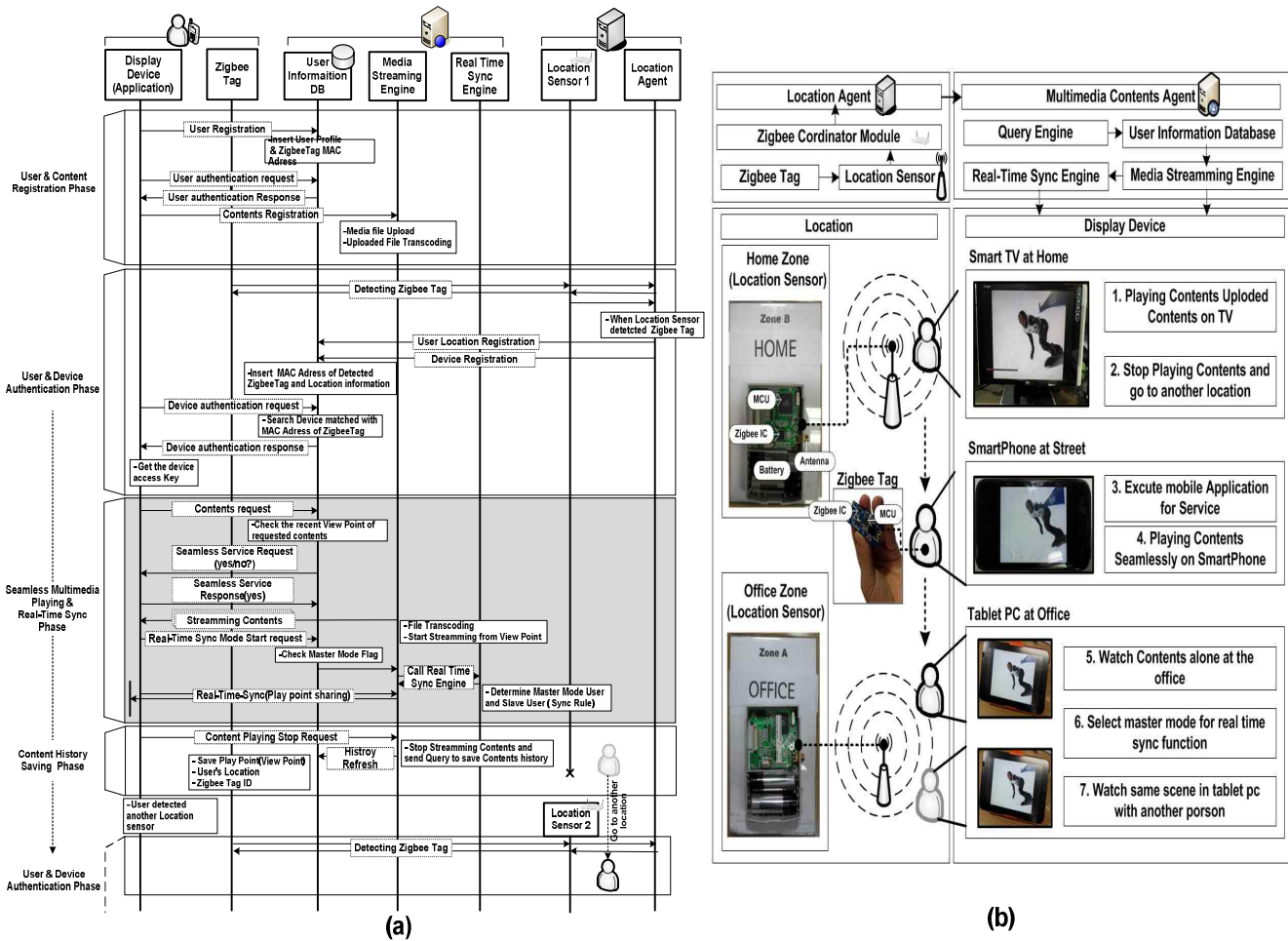
Figure 2. Protocol design (a) and service flow (b) for location-aware seamless multimedia push service

The Location Agent detects when user have Location Tag enters the ZigBee network. Typical ZigBee tag exist two types: The Location Agent detects when user have Location Tag enters the ZigBee network. Typical ZigBee tag exist two types: the integrated USIM with ZigBee transceiver in the smartphone and stand-alone ZigBee dongle. The motion detector senses any movement around the sensor. Hybrid positioning scheme due to two types of measurements from different sensors (IR, ZigBee) enhances location accuracy of the user. Also, an advantage of ZigBee zoning is that ZigBee tag store the user's profile. User profile contains user information, schedule and preferred services. A crucial benefit of the profile is that flexible multimedia push services can be customized to adjust user's specific needs. If there is person present, service appliances are turned on. When a user moves into a different spot, location is the significant contexts in order to determine which types of devices are available and how communication should be conducted to fit the user's needs. The platform enforces fast location detection as well as provides service roaming for wireless network where various display environments.

In the platform of our architecture several information are managed by context based protocol as shown in Fig. 2. The procedure includes initiate, request and response of service, multimedia and location information. Figure 2 shows the procedures in order to register user's current location as well as service profile in the platform and acquire user's service profile from the platform. First, in the case of user's service initiation, a user accesses the Location Agent, which gets the User ID using WPAN and requests User Registration to the platform. In the case of user's service roaming, the user accesses the Location Sensor#2 from Location Sensor #1. The Location Sensor #2 recognizes the User using ZigBee. New intelligent applications will combine the characteristics of location-aware, device-aware and multimedia applications in varying degrees and forms. As shown in Fig 2(b), if a user move into the office, automatic recognizance of the presence of other devices through sensing the presence of neighboring beacons, allows the transfer of the current content seamlessly from the smart phone to the tablet.

IV. CONCLUTUION

Our platform architecture integrates location-aware scheme for seamless mobility with multimedia services by the cooperation of Location Agent and Multimedia Contents Agent. We expect that the proposed location-aware a multimedia delivery platform can be applied as intelligent to existing multimedia applications for N-screen service.

REFERENCES

[1] Younghun Yoo, Byung Chul Shin, Seong Gon Choi, Sang Kwon Kim, "User Mobility Mechanism for Seamless Multimedia Service in Home Networks," ICACT 2008, Fab 2008.

[2] K. Ha, K. Kang, and J. Lee, "N-screen service using I/O Virtualization technology", 2010 International Conference on Information and Communication Technology Convergence (ICTC), pp. 525-526, 2010

[3] Jun Lee, HyungSeok Kim, Jee-In Kim, "A Framework for Adapting Content of Social Network Services for Heterogeneous Devices," IEEE International Conference on Consumer Electronics (ICCE), pp506-507, 2012

[4] Kam Yong Kim, Seong Gon Choi, "Functional Architecture for User-Centric Multimedia Service on Mobile Station," 13th International Conference on Advanced Communication Technology (ICACT), pp.93-98, 2011

[5] S.J. Kim, K.J. Gil, H.S. Kim, S.B. Lim, and J.I. Kim, "Adaptive interactions in shared virtual environments for heterogeneous devices", Journal of Visualization and Computer Animation 21(5): 531-543 , 2010.

[6] Taiwon Um, Hyunwoo Lee, "Classification ofN-Screen Services and its Standardization," 14th International Conference on Advanced Communication Technology (ICACT), pp.592-602, 2012

[7] Jong-Hyoun Kim, Soo Hong Kim, "N-Screen Convergence Services Applied Hands and Objects Tracking in Educational Environment," 5th International Conference on New Trends in Information Science and Service Science (NISS), pp.412-415, 2011

[8] Ullah, F., Sung Chang Lee, Seng Kyoun Jo, Hyun Woo Lee, "Dynamic Addition and Deletion of Device in N-Screen Environment," Fourth International Conference on Ubiquitous and Future Networks (ICUFN), pp.118-122, 2012

[9] 2012 Dropbox, https://www.dropbox.com/, Dropbox Service

[10] Korea Telecommunication, http://ucloud.com/main.kt, uCloud Service

[11] Goo Jun, "Home media center and media clients for multi-room audio and video applications," Consumer Communications and Networking Conference, 2005. CCNC. 2005 Second IEEE, 2005, pp. 257-260.

[12] J. Choi, D.K. Shin, and D. Shin, "Research and Implementation of the Context-Aware Middleware for Controlling Home Appliances", IEEE Transaction on Consumer Electronics, 51-1. pp.301-306, 2005.

[13] Soraya Ait Chellouche, Julien Arnaud, Daniel Négru, "Flexible User Profile Management for Context-Aware Ubiquitous Environment," Consumer Communications and Networking Conference (CCNC), 2010 7th IEEE, 2010.

[14] Chung-Ming Huang, Chung-Wei Lin, and Chia-Ching Yang, "Mobility Management for Video Streaming on Heterogeneous Networks," Multimedia, IEEE, 2010.

[15] Kwong Huang Goh, Jo Yew Tham, Tianxi Zhang, Timo Laakko, "Context-Aware Scalable Multimedia Content Delivery Platform for Heterogeneous Mobile Devices," The Third International Conferences on Advances in Multimedia, 2011