

EDS scenario Implementation for the Multiple Network and Multiple Service Environments

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Abstract—The wide deployment of wireless access technologies and the integration of various access network interfaces into a single terminal, allows mobile end-users to be always connected to the IP network, and to use those interface simultaneously. In this paper the CTE provides various access network interfaces capabilities, allowing reception of data over multiple service providers with different characteristics. Considerations for multiple network and service provider environments are regarded as essential for the successful deployment of convergence services in Next Generation Network (NGN). Event Driven Service (EDS) is regarded as a typical convergence service converging different functions of multiple service providers. This paper first describes the deployment model of NGN convergence services for multiple service provider environments. It also covers the service scenario of EDS, a convergence service for multiple service provider environments in NGN. Multiple provider environments stimulates the unified identifier management, namely ubiquitous identification (U-ID), to enable users to be provided convergence services without awareness of multiple provides. Then the designed structure and procedures of U-ID based EDS are given. Finally, the implementation results tested on Korea Advanced Research Network (KOREN) are described.

Index Terms— EDS(Event Driven Service), Multiple Service Environment, NGN(Next Generation Network)

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I. INTRODUCTION

Convergence services should operate seamlessly across NGN infrastructures provided by multiple network and application service providers[1]. Seamless interconnection between networks managed by different network providers and seamless interoperability of services offered by different application service providers (ASPs) are required. Networks will support multi-provider environments. NGN will stimulate an evolution of the multi-service and multi-network provider environment or 'multi-provider' interoperable environment for open services. Networks will support multi-provider environments.

There had been no efforts to deploy the context aware service as one of the NGN convergence services before EDS was introduced in Y.Sup3[1] though NGN is regarded as the main infrastructure for the future ubiquitous environment.

These trends force us to explore a new paradigm of an NGN convergence service considering the unified ID management and context aware service paradigm together i.e., U-ID based EDS. We first outlined the service feature using scenario-based approach, designed the structure and procedure, and implemented. The implemented result requires verification process in the actual environment of NGN.

Convergence Service will emerge as an important business model in the NGN environments, e.g., BcN (broadband convergence network) in Korea. Hence, much effort needs to be concentrated into establishing the new concepts of convergence service scenarios via research and standardization activities. Moreover, we need to explore technical basis on unified management of identification, certification, and profile management to provide the convergence services. Therefore, the testing and verification process is required for confirmation after applying the developed results into the actual network. This leads to the verification tests using the network, that is similar with the future networks, and applying the convergence service scenario, that is expected to be applied into the future networks. Adapting and applying KOREN for this purpose of verification tests is very important in that KOREN is the very infrastructure for testing BcN, that

will be deployed in the future, and the most appropriate testing environment consequently.

This paper first describes the deployment model of convergence services in NGN. The service scenario of U-ID based EDS, a convergence service in NGN, is introduced and its structure and required procedures are described next. The applied scheme and the results after implementation are explained and the conclusion is lastly given.

II. DEPLOYMENT MODEL OF CONVERGENCE SERVICE FOR MULTIPLE NETWORK AND SERVICE PROVIDER ENVIRONMENT IN NGN

A service architecture representing deployment aspect for multiple provider environments is presented in Figure 1[1]. The application service (AS) may provide convergence services by coordinating between multiple service providers and referencing service profile that includes service attributes registered from user equipments such as convergence terminal equipment (CTE).

As users move across different environments, their services are managed and delivered to them seamlessly and with ease. The architecture includes AS, Service Stratum, Transport Stratum, convergence gateway (CG), and CTE. AS dedicated to any service providers may interact with Service Stratum via application network interface (ANI) for the manageable user services.

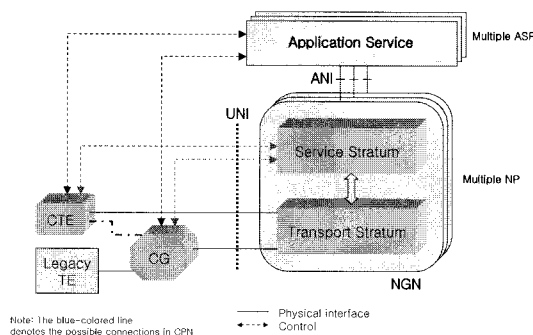


Figure 1. Deployment model of convergence service for a multiple service provider environment.

AS also coordinates the interactions required for the convergence services covering multiple ASPs while it covers required interactions between End-user Functions (including CTE) where AS plays an important role for coordination between multiple providers. Depending on particular deployments,

service coordination can be placed in application service with the core and access networks, or can be distributed with components residing in the CTE.

The convergence actually occurs on the functional or contents level according to Y.sup3[1]. A convergence service showing the functional convergence aspect is EDS and its service scenario will be discussed in the next chapter.

III. SERVICE SCENARIO OF A CONVERGENCE SERVICE, U-ID BASED EDS

3.1. Service model of EDS in ITU-T

Event driven service (EDS) is listed as a typical convergence service performing convergence between functions owned by multiple service providers[1]. EDS provides users with the relevant information and the communication by the various personal conditional environments. An alternative terminology for events for network-related applications is 'triggers' - these are assumed to be included in the present description.

Events could be defined as any activities which occur within a service area caused by user actions, connectivity signals, signals related to service selection and service availability, signals classifying provider and associated control signals, and billing signals.

Events can be managed, for example, as part of a context-aware application. EDS could carry out a procedure for processing user's requested information about mobile network-based entities, such as the combination with various applications, such as a location based service (LBS) and area information. In NGN environments, the user can be serviced his/her customized EDS in the network. The EDS automatically connects the appropriate CTE consistent with a user profile. EDS can also send the collected information to other requesting users by way of event information and using the procedures of combination with other services.

The user can record/retrieve the user-related information to/from the information base through EDS. The information base may initially reside in the server of the provider side. The cache of the CTE may partly store the information and can be autonomously updated.

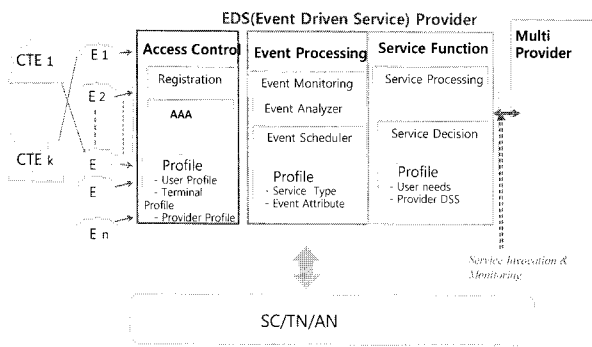


Figure 2. Service model of EDS.

EDS consists of Access Control Function, Event Processing Function, and Service Function as shown in Figure 2[1]. The services to be converged include LBS (Location Based Service), DSS (Discovery Service), and Push service, etc. in the multi-provider environment. E1, E2, ..., En refer to events or triggers.

Access Control function covers registrations of user profiles, terminal profiles, and provider profiles for providing the proper application services with applying AAA to users. The user requesting services could be offered with performing AAA function on the basis of preregistered profile data such as user ID, and Terminal ID, etc. These multiple IDs used in the profiles demand an efficient method for manageable service provision that naturally leads to the introduction of a unified ID management system in the next chapter [2].

Event processing function makes the choice of the best suited access option, by taking into consideration the application requirements and user preferences by analyzing event attributes. All this information is maintained and structured in profiles, which are located in the Access Profile of the Access Control. These profiles can be accessed by the service function in order to combine link-specific parameters with user preferences and application requirements.

3.2. Information flow of U-ID based EDS

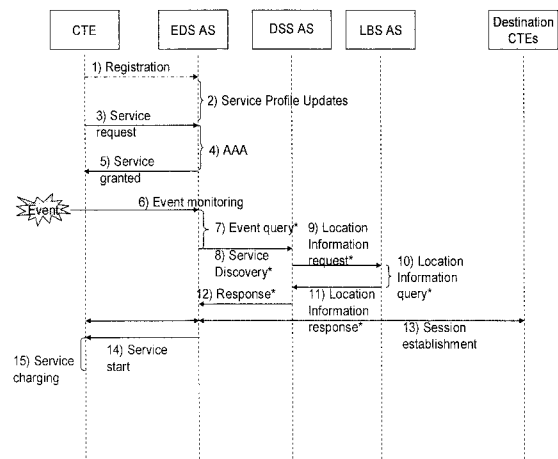
3.2.1 Information flow of EDS

Information flow assumptions are as follow in Figure 3. When User is not subscribed to ASP (or SP) then he/she will be charged on the usage basis by each SP.

Details of AS are hidden for simplicity.

DRM processing for license transaction in AS is also hidden.

The flows shown here are at high level and not meant to show the actual protocol procedures. Event can be generated by user's request or according to movement of CTE.



Note: Steps with * are executed only if needed.

Figure 3. Information flow of EDS.

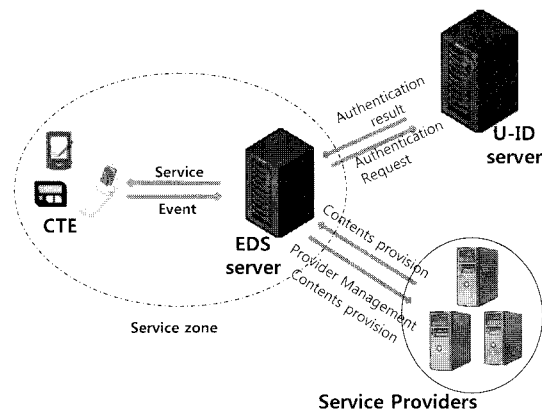


Figure 4. Interactions for U-ID based EDS.

EDS is provided combining the service functions listed as follow i.e., access control, event processing, service function. The detailed procedures in these functions are described in the next clauses.

● **Access Control:** This function requests the authentication for the access within the service area and manages the attached terminals. If attached terminals enter the service area without the users' requests, they will be automatically managed using the access codes in the terminals. Interactions for access control is shown in Figure 5.

● **Registration:** Terminals or users that entered service area are registered into the Access Control system. This process is carried out without access requests for immediate reaction to the possible occurrence of events

● **Authentication, authorization:** The appropriate rights are authorized according to the information that passed U-ID authentication process. The personal information that passed U-ID authentication is

analyzed and used to authorize the range of service rights that fits to the service user level and system capacity.

● Profiles

- User Profile that passed U-ID authentication is registered to enable the efficient user management and service.
- Terminal Profile registered to the current service area is registered to enable the analysis of available services. For example, a terminal that supports not DMB but WLAN will broadcast the intended contents via IP streaming service.

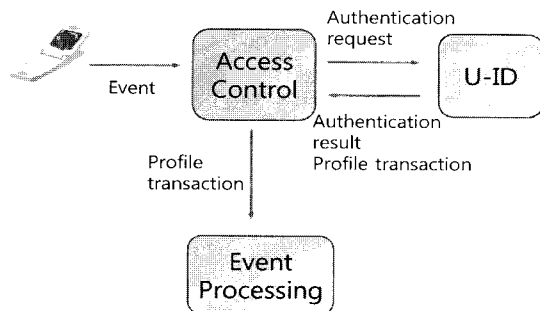


Figure 5. Access control for U-ID based EDS.

● **Service Decision:** Services requested by users are linked with providers which can provide the required service. The priority or popularity can be used to choose the most appropriate service providers.

IV. DESIGNED STRUCTURE AND IMPLEMENTATION

The U-ID based EDS is designed on the structure and procedure level applying the service scenario described in chapter 3. The details of the designed structure and procedures are explained in this chapter.

4.1. Designed structure and procedures of U-ID based EDS

U-ID based EDS is designed to consist of two parts, U-ID system and EDS system. We designed each system and considered interaction between two systems. The designed U-ID system roughly consists of two parts, a U-ID manager and the unification profile. Fig. 6 show the structure of the U-ID manager, and the structure of the unification profile each.

As shown in Fig. 6, the U-ID manager is composed of 8 functions, Identifier Functions, Authentication Functions, Accounting Process, Administrator Management, Unification Profile Management, User Communication Management, Service Provider Communication Functions, and Communication & Data Confidentiality.

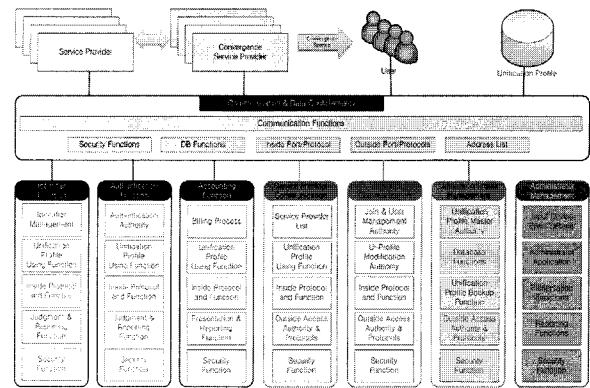


Figure 6. Structure of the U-ID manager.

4.2. Implementation and verification

The testing and verification process is required for confirmation after applying the developed results into the actual network. This leads to the verification tests using the network, that is similar with the future networks, and applying the convergence service scenario, that is expected to be applied into the future networks. Adapting and applying Korea Advanced Research Network (KOREN) for this purpose of verification tests is very important in that KOREN is the very infrastructure for testing BcN, that will be deployed in the future, and the most appropriate testing environment consequently. The implemented result was verified through interworking tests that was carried out in Inje Univ. site and Dongeui Univ. site, with which KOREN is linked.

Inje Univ. site manages a U-ID management server, unified profile, and a client. And Dongeui Univ. site manages an EDS management server, EDS database, and a client. Figure 7 shows the configuration of the testbed for interworking test though KOREN. Figure 8 shows the captured image of the video taken during the test through KOREN[6].

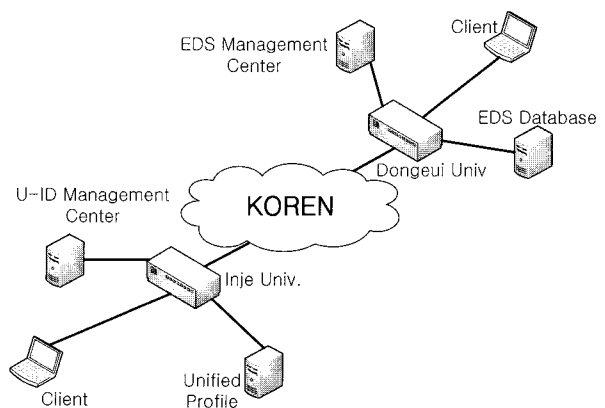


Figure 7. Configuration of the testbed for interworking test on KOREN

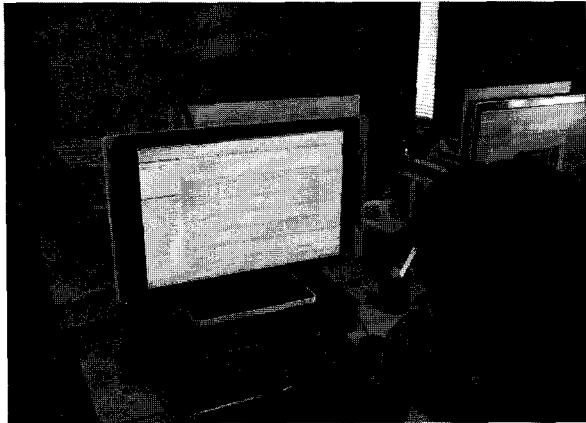


Figure 8. The captured image of the interworking test through KOREN.

Figure 9 shows the displayed screen of the console terminal during Join Process that allows user terminals to join the services provided by U-ID based EDS. However, this could be provided by only a partial use of the U-ID based EDS, more efficient and simple than the ENUM case that requires the full functionalities of ENUM[7].

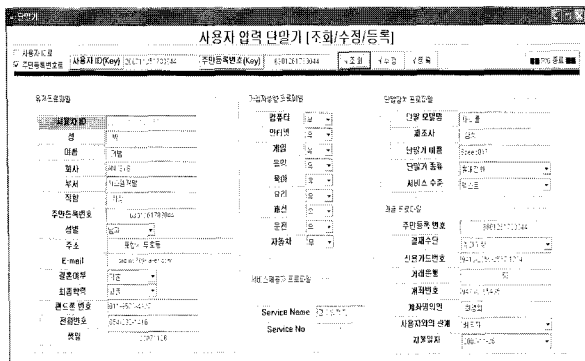


Figure 9. The displayed screen of the console during Join process.

V. CONCLUSION AND FUTURE WORKS

Researches on U-ID based EDS, and implementation and testing via KOREN were carried out by the participating members of the universities and company. More specifically, architecture and roles of U-ID based EDS, information flows unified profiles were studied, designed and implemented to be tested in KOREN environment. The studied results were presented as the contributions in the international standardization meetings such as ITU-T[8][9].

The proposed scenario includes the functional architectures and main information flows for U-ID based EDS. Management software and unified profiles were established for interworking tests of U-ID based EDS in the KOREN environment. KOREN was used as a substitute for NGN in the test. The result of the test shows the possibilities of NGN (or KOREN) as the service platform for providing convergence services to the users in the multiple service provider environments that will build infinite business chances in the future market of ubiquitous services.

The testing software can be utilized for studying unified ID managements (U-ID) and convergence services (EDS) innovation and improvements for the future ubiquitous environments. The U-ID based EDS procedures need to be more studied for improvements and scalability.

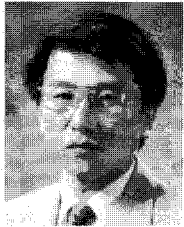
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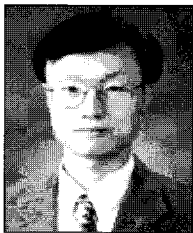
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