

# Structure and service applications for smart work environment

Sungyeol Kang

College of Business Management, Hongik University

## 스마트워크 환경을 위한 구조와 서비스 응용

강성열

홍익대학교 상경대학

**Abstract** The advance in mobile devices such as smartphone, wireless networking, and Internet technologies enables many organizations to improve drastically not only the ways of carrying out every job activity but also their business processes and operations management. As the effort to work smart utilizing the technological change, they are interested in the implementation of Smart Work environment. In this paper we examine several types of smart work and their service scenarios. We also describe the structures of networking and system configurations for building up the smart work environment. These study results may be useful as reference materials for the successful implementation of smart work.

**Key Words** : ICT, smart work environment, service application, smart work center, video conferencing service

**요약** 스마트폰을 비롯한 모바일 장비, 무선 네트워킹과 인터넷 등의 ICT 기술 진전은 일상생활 뿐만 아니라 제반 업무 수행의 방식, 비즈니스 프로세스, 서비스 조직 운영 양태에 획기적인 변혁을 가능하게 하고 있다. 이러한 기술적 진전에 부응하여 제반 일을 보다 수월하고 효율적으로 수행할 수 있도록 하자는 노력의 일환으로, 많은 조직체들은 스마트워크 환경 구현에 관심을 기울이고 있다. 본 논문에서는 여러 가능한 스마트워크 유형들을 살펴보고 그러한 스마트워크 환경 구현을 위한 네트워킹과 시스템 구성의 구조와 서비스 시나리오들을 다루었다. 또한, 스마트워크 환경에서 핵심적인 응용으로서 컨퍼런싱 서비스의 호 설정 및 호 해지 절차와 아울러 그 서비스 시나리오와 사용 케이스들을 살펴보았다. 이러한 스마트워크 환경을 위한 구조와 서비스 응용에 대한 연구는 스마트워크의 환경 구현에 유용한 가이드라인으로서 사용될 수 있을 것이다.

**주제어** : 정보통신기술, 스마트워크 환경, 서비스 응용, 스마트워크 센터, 영상회의 서비스

## 1. INTRODUCTION

The advance in mobile devices such as smartphone, wireless networking, and Internet technologies enables

many organizations to improve drastically not only the ways of carrying out every job activity but also their business processes and operations management. As the effort to work smart utilizing the technological change,

\* This work was supported by 2013 Hongik University Research Fund.

Received 20 January 2016, Revised 30 January 2016

Accepted 20 February 2016, Published 28 February 2016

Corresponding Author: Sungyeol Kang (Hongik University)

Email: skang@hongik.ac.kr

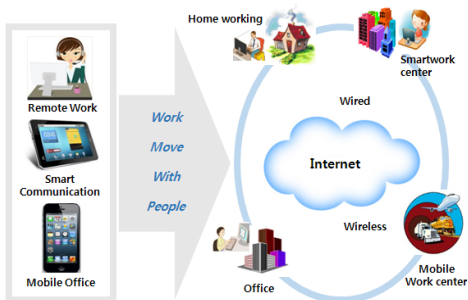
© The Society of Digital Policy & Management. All rights reserved. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ISSN: 1738-1916

they are interested in the implementation of Smart Work environment.

Smart work is a pervasive concept using ICT arrangements in which employees can work anytime, anywhere with any devices without any limitation in working location and time as shown in [Fig. 1] [1, 2, 3]. Some benefits of the smart work environment are as follows.

- Enhancement of work productivity and worker satisfaction
- Reduction of total expenditure
- Utilization of expert ability
- Enforcement of organization's specialization
- Realization of work-life balance
- Enlargement of working chance
- Decrease of centralization in large city and enhancement of local economy in local city



[Fig. 1] Basic concept of smart work environment

In this paper we examine several types of smart work and their service scenarios. We also describe the structures of networking and system configurations for building up the smart work environment.

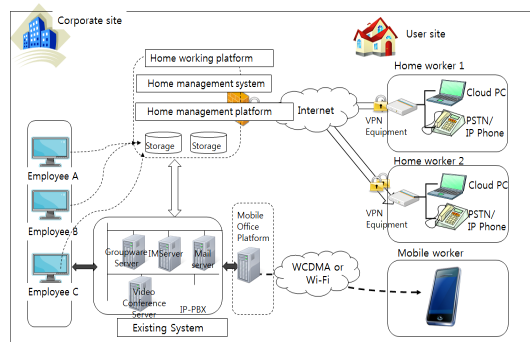
## 2. TYPE OF SMART WORK ENVIRONMENT

Smart work environment can be divided into four categories: home working, smart work center working, mobile work center working, and office working. The home working is about executing any work by providing and utilizing the necessary facilities at home

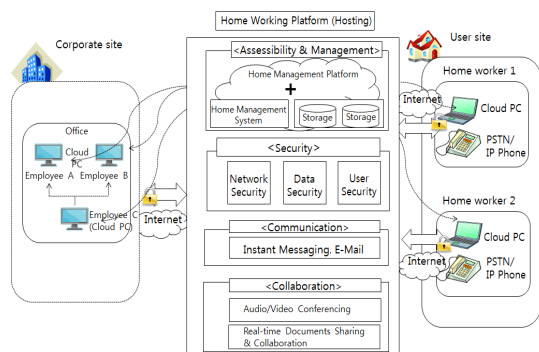
for saving time, space, and physical resources, while smart work center working is about working at smart center near home for saving commuting time and promoting creative idea under almost same facility environments as office. The mobile work center working is about carrying out any work by using portable sets as smartphone, PDA, I-Pad, and notebook PC over mobile networks. And office working is about performing any work at office [4, 5, 6].

### 2.1 Home working

The home working is about working at home using ICT facilities which are established at corporate company. The interconnection between home user and corporate company is via Internet or mobile network as shown in hown in [Fig. 2(a)] and [Fig. 2(b)] [7, 10].



[Fig. 2(a)] Home working service, using in-house platform



[Fig. 2(b)] Home working service, using hosting platform

The basic entities for home working are as follows.

- **Infrastructure:** The infrastructure means ICT equipment as notebook PC, monitor, keyboard, mouse, scanner, copy machine, and personal web camera for tele-conference as well as telecommunication networks [8, 10].
- **Security:** The security is requisite as anti-virus, intrusion protection as firewall, integration PC security, DB and DRM content protection, network approaching control, and VPN.
- **Accessibility:** The necessities are offered as electronic signature, messenger, E-mail, remote cooperation management, etc.
- **Management:** The necessary management system and data are offered as DMS, PMS, data backup, personal office equipment.

### 2.2 Smart work center working

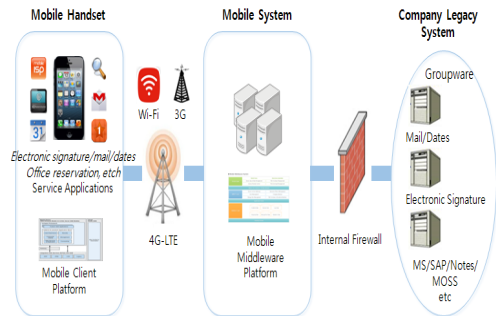
The smart-work center working is about working at special place, called “smart-work center” where every ICT facilities are established as official office near household site. Smart-work centers can be divided into three categories as follows.

- **Public transportation oriented work center:** Smart-work center is installed and operated at train terminal, airport, bus terminal for private or public organizations for public based service.
- **Business focused work center:** Smart-work center is installed and operated at large building for business or small venture capital people.
- **Household site oriented work center:** Smart-work center is installed and operated at near house for avoiding traffic congestion and reducing transportation inconvenience during rush hour.

### 2.3 Mobile office working

The mobile office working is about working at anywhere or anyplace using mobile terminals and mobile Internet by connecting to office data, process,

and systems as shown in [Fig. 3] [9, 14, 15].

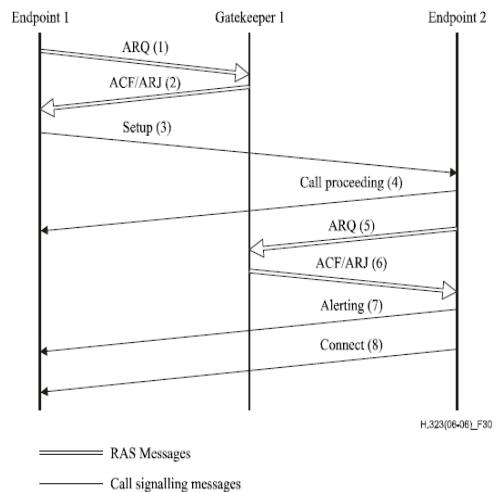


[Fig. 3] Mobile office working service

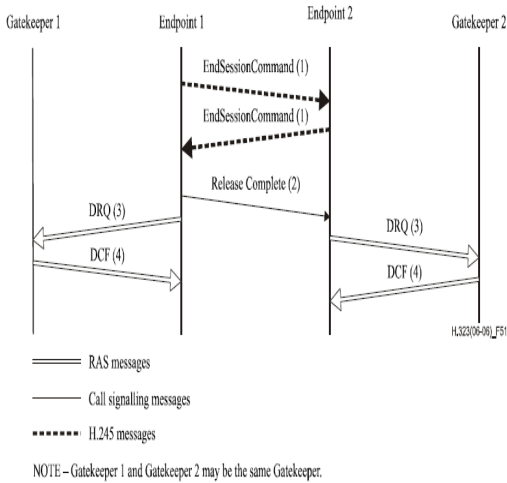
## 3. SERVICE SCENARIOS OF A/V CONFERENCING SERVICE

One of key smart work applications will be high quality A/V conferencing system. There are two kinds for the system: SIP based conference service and H.323 based conference service.

Here, the call setup and release procedures of H.323 conference service are shown in [Fig. 4] and [Fig. 5].



[Fig. 4] Call setup procedure of H.323 conference service



[Fig. 5] Call release procedure of H.323 conference service

Typically, according to the quality and the way of provisioning, audio/video conferencing service can be categorized as follows [10].

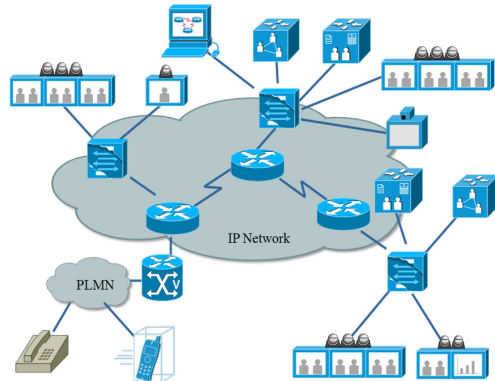
### 3.1 Video conferencing

Video conferencing uses A/V telecommunication capabilities to connect remote people at different sites. This can be as simple as a conversation between people in private offices (point-to-point) or involve several (multipoint) sites in large rooms at multiple locations. Besides the audio and visual transmission, collaboration capabilities for instant sharing of documents, exchanging messages and sharing whiteboards are incorporated. Video conference system can be installed in dedicated system or general-purposed system. Usually this video conference service is provided on generic network [4].

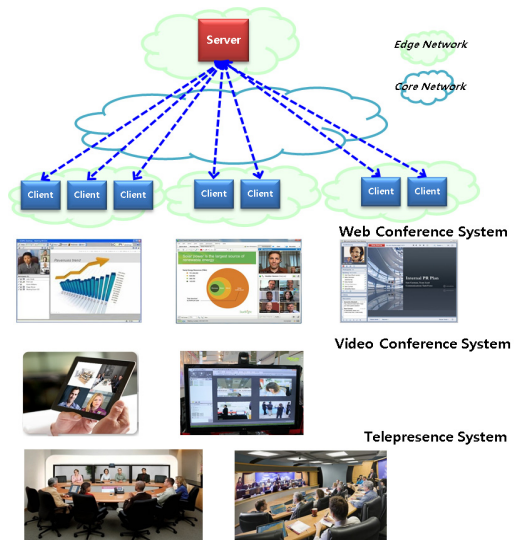
- Dedicated systems have all required components packaged into a single piece of equipment, usually a console with a high quality remote controlled video camera.
- General-purposed systems (Desktop PC) are with add-ons to normal personnel computers, transforming them into video conference devices.

### 3.2 Telepresence conferencing

Telepresence service refers to a set of technologies which allow people to feel as if they are present, to give the appearance of being present, or to have an effect at a place other than their true location. This service usually requires QoS guaranteed network, for instance, enterprise network.



[Fig. 6] High level architecture of telepresence conference service



[Fig. 7] Use case of A/V conference service

Nowadays requirements for more capabilities and fewer restrictions at a significantly lower cost than traditional bridging hardware drive cloud-based video

conference system. While, the high level architecture of Telepresence conference service is shown in [Fig. 6] [11, 12, 13].

#### 4. CONCLUSION

The home working, smart-work center working, mobile office working, video and telepresence conference are described for smart work implementation, along with the necessity and benefits of smart work environment. Especially, the service scenarios and use case of audio/video conference service are mentioned for remote-site workers, along with the call setup and call release procedure in smart work environment. These study results may be useful as reference materials for the successful implementation of smart work.

#### REFERENCES

- [1] Seung-Yeob Yu and Kyoo-Sung Noh, The power analysis of smart work industry and increase plan, *Journal of Digital Convergence*, Vol. 9, No. 6, pp. 187 - 196, 2011.
- [2] Hyejung Lee, Jungwoo Lee, Developing A policy framework for smartwork : task, technology, people, organization and management, *Journal of Digital Convergence*, Vol. 10, No. 11, pp. 145-164, 2012.
- [3] Broadcasting and Telecommunication committee & National Information Society Agency, The introduction and operation guidebook of smart-work for cooperate company, 2011.
- [4] S. K. Park, J. H. Lee, Smart work technologies and standardization trends, *TTA Journal*, Vol. 136, pp. 79-84, 2011.
- [5] National Information Society Agency, Excellent Cases of Smart Work, 2012.
- [6] Information Telecommunication Policy Research, Current status and propagation method of smart-work, 2010.
- [7] Economics and management research in Korea Telecom., Introduction policy and innovation method of smart work and mobile office, 2011.
- [8] Economics and management research in Korea Telecom., The status and propagation project of Teleworking, 2010.
- [9] W. Hyun, S. G. Kang, Standardization trends and smart work - Focused on telepresence, *Electronics and Telecommunications Trends*, Vol. 26, No. 2, pp. 42-49, 2011.
- [10] TD124-Y.fsn, ITU-T SG13, New draft Supplement Y.fsn, Framework and service scenarios for smart-work, November 2013.
- [11] TD8-F/H. TPS-Arch, ITU-T SG16, "Telepresence system architecture", January, 2013.
- [12] TD30-F.TPS-Reqs, ITU-T SG16, "Definitions, requirements, and use cases for Telepresence Systems", January, 2013.
- [13] TD31-H.TPS-AV, ITU-T SG16, "Audio/video parameters for telepresence systems", January, 2013.
- [14] K. O. Lee, S. Kang, User requirements and service scenarios for mobile VoIP, *ICDPM 2013*, pp. 191-192, Oct. 2013.
- [15] H. B. Ko, H. D. Lim, and J. I. Lee, Policy directions and strategies for boosting cloud computing-based smart mobile office, *Journal of Korean Information Science Society*, Vol. 259, pp. 13 - 19, 2010.
- [16] Lark Sang Kim, "Convergence of Information Technology and Corporate Strategy", *Journal of the Korea Convergence Society*, Vol. 6, No. 6, pp. 17-26, 2015.
- [17] Seong-Hoon Lee, Dong-Woo Lee, "A Case Study in Japanese and Prospect of Cloud Computing Service in Convergence Age", *Journal of the Korea Convergence Society*, Vol. 6, No. 1, pp. 17-22, 2015.

강 성 열(Kang, Sungyeol)



- 1981년 2월 : 서울대학교 산업공학과(공학사)
- 1983년 2월 : 서울대학교 산업공학과(공학석사)
- 1992년 3월 : 미국 Georgia Tech 산업공학과(공학박사)
- 1983년 ~ 1998년 : ETRI 책임연구원
- 1999년 3월 ~ 2000년 2월 : KAIST 초빙교수
- 2000년 3월 ~ 현재 : 홍익대학교 상경대학 교수
- 관심분야 : 정보통신, 전자상거래, 디지털 마케팅
- E-Mail : skang@hongik.ac.kr