A New Step on Transforming VoIP into the Ubiquitous Service Era

Andrey Kim
Department of Industrial Management
Kumoh National Institute of Technology, Uzbekistan
Email: kimandy79@gmail.com

Wang Si
Department of Industrial Management
Kumoh National Institute of Technology, China
Email: ws68052788@sohu.com

Hoe-Kyun Shin
Department of Industrial Management
Kumoh National Institute of Technology, Korea
Emai: hkshin@kumoh.ac.kr

Management Review: An International Journal
Volume 2, Number 1, June 30, 2007
Pages: 41-50
ISSN: 1975-8480

Management Review: An International Journal
Volume 2, Number 1, June 30, 2007
Pages: 41-50
ISSN: 1975-8480

Sang Hyung Ahn
Editor-In-Chief
Seoul National University

Email: KINFORMS@Korea.com

Management Review: An International Journal

A New Step on Transforming VoIP into the Ubiquitous Service Era

Andrey Kim
Department of Industrial Management
Kumoh National Institute of Technology, Uzbekistan
Email: kimandy79@gmail.com

Wang Si
Department of Industrial Management
Kumoh National Institute of Technology, China
Email: ws68052788@sohu.com

Hoe-Kyun Shin
Department of Industrial Management
Kumoh National Institute of Technology, Korea
Emai: hkshin@kumoh.ac.kr

ABSTRACT

Over the coming years, operators will be using IP networks to replace their current PSTN. VoIP opens doors of opportunities such as cost saving and increased flexibility as well as for the uninvited users, viruses, worms and other unexpected threats from the network. In this paper, I have described benefits and threats that VoIP should face to get the leading place in providing the public phone service. By deploying a mobile wireless networking technology, we can step into the ubiquitous VoIP era. However, only talking about the service model and high-technology challenges is not enough. More facets should be tackled like regulatory requirements.

***Keyword**: VoIP, PSTN, service model*

INTRODUCTION

During the past 10 years, the Internet has been widely adopted by both vendors and consumers. That led to the creation of the electronic marketplace, which swept out business barriers such as time, geography, language, currency, and culture. Consumer goods on the Web can be reviewed by millions of customers worldwide and be purchased at a low cost.

Except services that usually accompany the brick-and-mortar product purchasing context, the online stores offer a great number of Web-based services such as product reviews, product comparison tools, personalized shipping, personal offering, and other services that are tailored to individual customers (Chellappa and Kumar, 2005). Products on the Web are not just generic products but they are actually augmented products (Levitt, 1980), and this augmentation is the result of services that envelop a product to create a consumer's product purchasing experience. In a telecommunication industry, consumer selects a company that offers other services, except phone call service, he or she would like to have at the lowest price. With the rapid emergence of a new voice-over-IP (VoIP) service, the range of services has been expanded and many of them are "free". This exerts more pressure on telecommunication industry and impacts on the revenue growth (Shin, 2006).

The objective of this study is to describe the VoIP conceptual and service models. There are benefits and threats that VoIP should face to get the leading place in providing the public phone service in ubiquitous era. The VoIP service model is described by the Levitt's model (Levitt, 1980).

LITERATURE BACKGROUND OF VoIP

How VoIP works

IP technology treats voice as an application, destroying the old distinctions between "voice" and "data" that are a standard part of Public Switched Telephone Network (PSTN). With VoIP,

telephony signals are digitized and transmitted as packets to their destination, just as an email, streaming video or any other kind of IP transaction. Figure 1 depicts a simplified VoIP network layout.

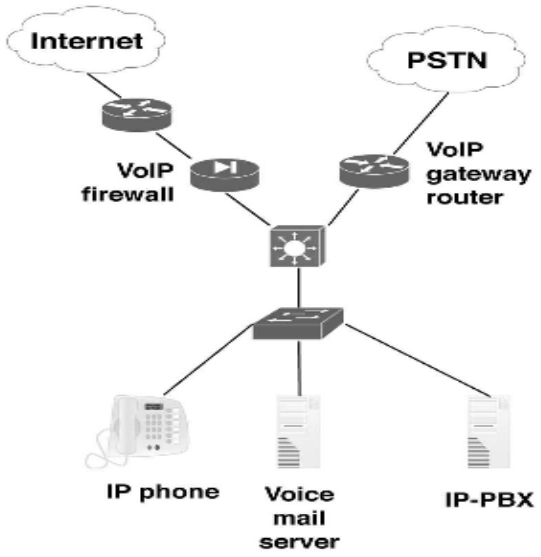


Figure 1 Simplified VoIP network layout

A VoIP transmission can be performed among terminals or endpoints, a means of setting up the call, through the gateways that connect different networks. The endpoint is the phone - a traditional phone with an adapter, a dedicated IP-phone, or computer with a microphone. Call signaling is carried out by a call processing manager or "IP-PBX" (Private Branch eXchange), which sets up the call, handles routing, and provides configurations to endpoints. The two major signaling protocols are H.323 and Session Initiation Protocol (SIP). Both signaling protocols use known ports or ranges of ports for call setup, but the actual conversation takes place over high UDP ports negotiated on the fly (Edelson, 2005).

A gateway compresses and packetizes voice data and sends it to the IP network. It must translate VoIP signaling protocols to SS7,

the signaling protocol used in the PSTN. To make a call – or access voice mail, or have a telephone number – a VoIP client registers with an IP-PBX. The client sends a request to a gateway which resolves the telephone number to a network address. When a connection is established using one of the signaling protocols, the caller's voice is digitized, compressed, possibly encrypted, and packetized using Real Time Protocol (RTP). RTP packets are then wrapped in UDP datagrams. These travel directly between the participants and are re-assembled by a voice processing application, based on sequence numbers and timestamps in their headers (Edelson, 2005). There are four different types of connections providing VoIP (Kim and Parameswaran, 2004):

- IP to PSTN trough Internet
- IP to PSTN without Internet
- IP to IP
- PSTN to PSTN.

Security issues

As well as introducing opportunities for the wide use of VoIP, increased flexibility and cost savings, IP networks also introduce a number of security concerns. These include traditional threats such as hacking and viruses, as well as those associated with the voice environment, including privacy, service theft, denial of service attacks, and service reliability (Edelson, 2005; Rowe, 2005; Whitworth, 2006).

Even though a company is not able to implement 100% military level security, it can choose the appropriate security measures to mitigate the risk that is related with VoIP. The main requirements for VoIP security (Edelson, 2005):

- VoIP network components should be dedicated, both for security and performance.
- Voice and data traffic should be separated.
- Firewalls are needed where traffic might legitimately flow between voice and data networks.

- Simple packet filtering should be fully done where no cross-traffic is allowed.

Wireless network presents more challenges for VoIP security.

Benefits

The main reason of why people and organization choose to VoIP is cost. Cost benefits associated with a move to VoIP typically reach savings of around 30% (Whitworth, 2006). Along with the traditional phone service, VoIP providers introduce new innovation such as area code mobility, real-time billing and service provisioning, and easy conference calling. Personal digital assistant (PDA) allows consumers to send voice over a WiFi to the Internet. Broadcasting content can be viewed over cellular phones or other dedicated terminal by implementing digital multimedia broadcasting. Each of this embeds IP voice and can be regarded as VoIP (Shin, 2006).

VoIP service model

A product on the Web is more than the core value it provides or its price; rather, it is the bundle of attributes, services and perceived benefits that accompanies its purchase (Chellappa and Kumar, 2005). This view has been adopted from Levitt (1980) from his observation of physical markets: “In the actual world of markets, nothing is exempt from other considerations, even when price competition rages” In this paper I adapted Levitt’s total product concept to describe the VoIP service in Figure 2:

1) the generic service sought by customers – telecommunication;
2) the expected service, which represents the customer minimal purchase conditions – “Free” PC to PC communication, including calls, conferences;
3) the augmented service, which is the addition of extra or unprompted augmentations or benefits to the expected

product – “Free” PC to Phone, Phone to PC and Phone to Phone communication over IP ;

4) the potential service, which refers to everything potentially feasible to attract and keep customers – Ubiquitous “Free” VoIP by mobile IP

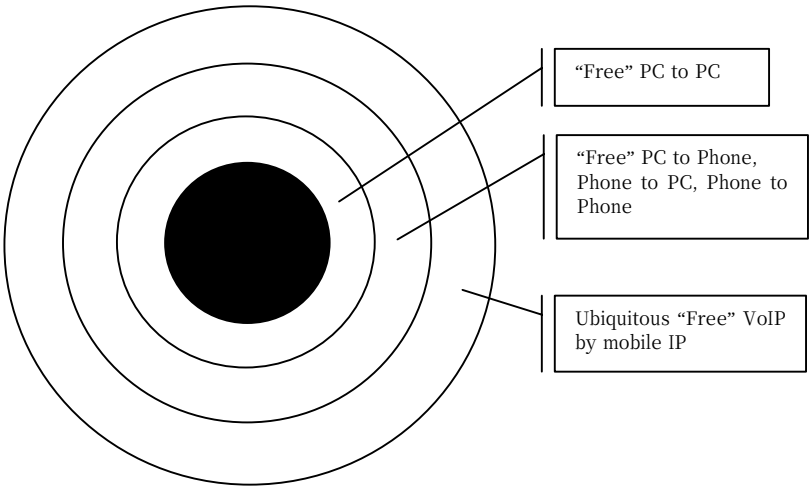


Figure 2 VoIP service model

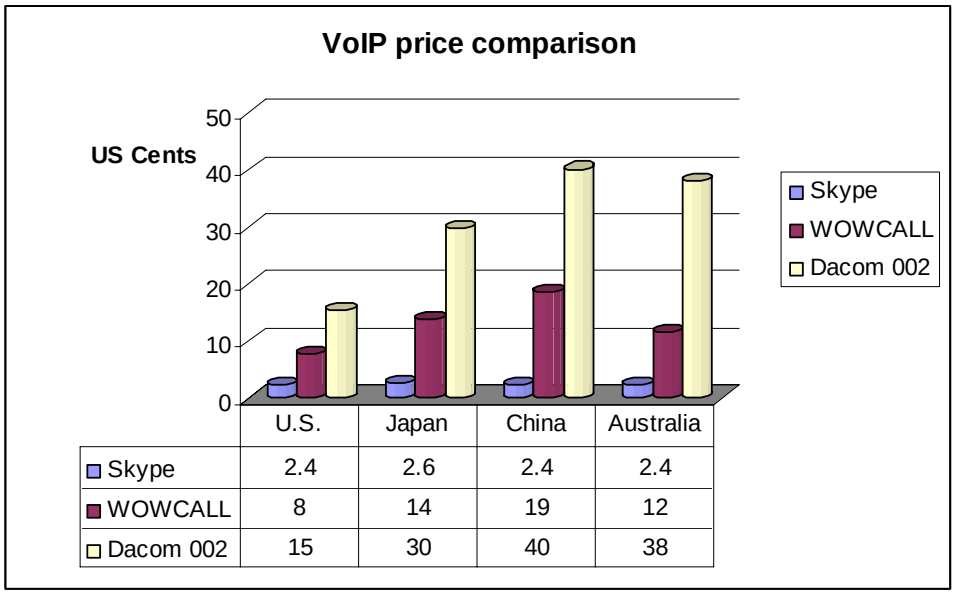
On the market of VoIP providers, a lot of companies have emerged that offer PC to PC communication for free. Skype, owned by online auctioneer eBay, is undoubtedly the leader. Competitors such as Yahoo, AOL, MSN, NateOn are integrating more call features into their instant-messaging clients in order to catch up with the leader (Marguerite, 2006). We can regard this as an expected service. By offering the service for free, companies try to involve as many potential customers as it is possible, who can be charged for the extended features. More vivid combat among vendors for the customers is going on in the augment service area, since for this services customer has to pay.

The following list shows more popular vendors that offer augment services:

- Skype

- Vonage
- Yahoo + Dialpad
- AOL
- WOWCALL
- Internetcalls

The list is far more incomplete, since more and more companies spring up on the horizon. They try to attract more customers by offering competitive conditions such as low-rate per minute plans or monthly plans for unlimited calls. Graph 1 shows the prices that different VoIP vendors offer today (Dacom 2006; Skype 2006; Wowcall 2006).



	U.S.	Japan	China	Australia
Skype	2.4	2.6	2.4	2.4
WOWCALL	8	14	19	12
Dacom 002	15	30	40	38

Graph 1 VoIP price comparison

Recently Skype started offering a free calling to phones in U.S. and Canada till the end of the year (Marguerite, 2006). In above cases customers cannot use services if they are on the move. Future generation wireless networks can enable mobile users to switch network access and experience uninterrupted service continuity anywhere, anytime. If this happens,

telecommunication companies will face tremendous competition, since VoIP offerings will be at significant lower cost.

Presently, telecommunication companies offer a broadband access to the internet over general packet radio service (GPRS), which is still pretty expensive. On the other hand, mobile wireless technology has gained tremendous popularity due to its ability to provide ubiquitous information access to users on the move (Siddiqui and Zeadally, 2006). Since wireless network technologies are not homogeneous, the next generation should face challenges of constituting different types of access technologies (Deshpande, 2002). The heterogeneity that will characterize future wireless systems instigates the development of intelligent and efficient handoff management mechanisms that can provide seamless roaming capability to end-users moving between several different access networks. And it can be called a ubiquitous VoIP. Ubiquitous VoIP is a potential service that can bring a competitive advantage to a company on the telecommunication arena.

CONCLUSION

In this article, we have presented overall overview of VoIP, benefits and risks that are accompanied while using VoIP. Over the coming years, operators will be using IP networks to replace their current PSTN. VoIP eventually can become the dominant provider of public phone service. By deploying a mobile wireless network technology, we can step into the ubiquitous VoIP era. But talking about the service model and high-technology challenges only is not enough. More facets should be tackled like regulatory requirements.

Some countries prohibit VoIP service where governments have monopolies in telephone and telecommunication service. Other restricts it to communication from computer to computer. Another countries permit without putting any technological standards or quality of service requirements (Shin, 2006). In the U.S., FCC has imposed the e911 requirement on VoIP providers that obliges

them to support emergency calls (Federal Communication Commission, 2004).

REFERENCES

Chellappa, R. and Kumar, K. (2005) Examining the Role of "Free" Product-Augment Online Services in Pricing and Customer Retention Strategies. Journal of MIS, 22(1): 355-377.

Dacom 002 rates. Accessed on June 9, 2006 http://www.telecity.co.kr/idd/idd03_002family.html?menu_gubun=1

Deshpande, N. (2002) Enabling Seamless Roaming between Wireless Networks. Intel Developer Update Magazine.

Edelson, E. (2005) Voice over IP: Security Pitfalls. Network Security, February: 4-7.

Federal Communication Commission (2004) Enhanced 911, March 10, 2004.

Kim, C., Parameswaran, M. Regulation (2004) VoIP: the Challenges and the Opportunities. In: Proceedings of 15th Portland International Conference on Technology Management.

Levitt, T. (1980) Marketing Success through Differentiation of Anything, Harvard Business Review, 58(1): 83-90.

Marguerite. R. (2006) Skype Offers Free Calling to Phones in U.S., Canada. Published on ZDNet News: Accessed on May 31, 2006 at http://news.zdnet.com/2100-1035_22-6072256.html.

Markopoulou, A., Tobagi, F., Karam, M. (2003) Assessing the Quality of Voice Communications over Internet Backbones, IEEE/ACM Transaction on Networking 11(5): 747-760.

Rowe, P. (2005) Networks N. VoIP – Extra Threats in the Converged Environment. Network Security, July: 12-16.

Shin D.H. (2006) VoIP: A Debate over Information Service or Telephone Application in US: A New Perspective in Convergence Era. Telematics and Informatics, 23: 57-73.

Siddiqui, F., Zeadally, S. (2006) Mobility Management across Hybrid Wireless Networks: Trends and Challenges. Computer Communication 29: 1363-1385.

Skype out rates. Accessed on June 9, 2006. http://skype.com/products/skypeout/rates/all_rates.html?currency=USD

Whitworth, M. (2006) VoIP – a Call for Better Protection. Network Security, April: 11-12.

WOWCALL rates. Accessed on June 9, 2006 http://wowcall.com/new/index.html

Management Review: An International Journal

Editorial Policy

Management Review: An International Journal (MRIJ) publishes intellectual findings to academies and practitioners in profit and non-profit organizations as well as local and global institutions on all aspects of managerial issues. MRIJ promotes the findings of sharing knowledge, exchanging experience and creating new ideas between academes and practitioners. MRIJ encourages all manuscripts of multi-disciplinary and cross-functional approaches with theoretical and empirical, technical and non-technical, and cases studies related to managerial issues in certain individual organizations, societies, countries.

Manuscript Submission

Your manuscript should be original contents that are not copyrighted, published, accepted for publication by any other journal, or being reviewed to any other journal while being reviewed by the Journal. Your manuscripts should be formatted with Century 12 points, double-spaced, left-aligned, 2.5 inches of top, 1.5 left and right, and 2 bottom margins on international standard (letter) size. The manuscript size may be between seven and fifteen pages. Manuscripts should follow generally accepted manuscripts printing guidelines. All manuscripts should be electronically submitted to the managing editor at kinforms@korea.com.

Volume 2 Number 1 June 2007

Management Review:
An International Journal

INFORMS Korea Chapter
Seoul National University
56-1 Shilim Dong, Kwanak Ku
Seoul 151-742, Korea
Printed in Korea

ISSN: 1975-8480 · Volume 2 · Issue 1 · Summer 2007