

# Residential Gateways

Kenichi Yasuda

Residential gateways – service nodes which provide multimedia messaging services to domestic and SOHO users – are expected to enjoy enormous demand in the future, and are being approached by various different industry sectors, including communications, household appliances, gaming, and broadcasting. This essay looks at the definition of the residential gateway as a service node for a domestic and SOHO network, and looks at the product strategy and outlook of the SOHO residential gateway based on a communications approach, which is the objective targeted by Oki Electric.

## The current state of residential gateways

In recent years, the IT revolution has been progressing at full steam, with the dramatic spread of the Internet. In Japan, the spread of the Internet through mobile telephones and broadband has been dramatic, in particular, the remarkable spread of ADSL, which exceeded 3 million subscribers as of the end of May 2002 <sup>1)</sup>. This indicates that the IT revolution, which has been focused mainly on large-scale companies in the past, is now reaching down to the personal level, where demand for IT provision in fields from domestic to SOHO is expected to rise.

However, current usage at the personal level is centred on Internet and e-mail, and use of systems based on broadband routers and wireless LANs is only just beginning.

What is more, satellite offices and telecommuting making use of IT are growing at a considerable rate, much of it centred on traditional retailers and small

businesses. At present, the networks used are mainly telephone networks, such as analogue cordless telephone, home telephone and business phone networks, or the like, and installation of IT using LAN, servers and the like, is progressing slowly.

## Residential gateway services

Oki have identified convergence between telephony, video images and IT as a key factor in residential gateway services for SOHO workers, and this paper will look at telephone convergence services in particular.

Telephony is the basis of communications, and applications are likely to expand by linkage to communications using Internet and groupware computers, and the like. A typical example of a telephone merger service proposed by Oki is described below.

### (1) IP telephone

The telephone, which is a basic means of communications, is realized as an integrated Internet service. Examples of this include YAHOO!BB's BB phone <sup>\*1)</sup>, and NTT-ME's "WAKWAK call go go" <sup>\*2)</sup>. An overview of the IP telephone is shown in Fig. 1 and Table 1.

Oki, recognizing that IP telephone is a key broadband application and one of the most fundamental broadband services, is actively developing this technology and in April 2002, the company set up an IP Telephony Promotion Centre for this purpose. In the future, we will be looking to provide not only equipment and systems, but also solutions which anticipate market needs.

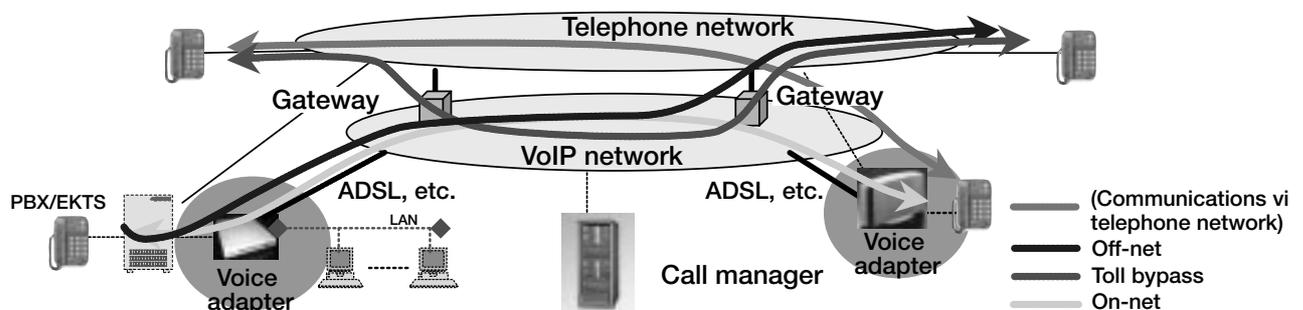


Fig. 1 Overview of IP telephone service

\*1) "BB phone" is the name of a service provided by Yahoo Japan Corporation. \*2) "WAK WAK Call Go Go" is a registered trademark of NTT-ME Corp.

Table 1 Types of IP telephone service

Service	Call format	Details of service	Examples
Repeater service	Toll bypass	Cheap, long-distance call service	Fusion My Line
Consumer-oriented IP telephone service	On-net + Off-net	Fixed rate calls as value added feature of broadband services	Yahoo! BB phone
Voice ASP service		Provides IP telephone numbers acquired in-house and IP telephone functions to access line providers	
Business-oriented IP telephone service		Flat rate inter-office and inter-group calls	NTT-ME WAKWAK Call Go Go Yahoo! BB phone
IP-Centrex service		High-functionality extension line service, as value added feature of wideband Ethernet & IP-VPN services	

**(2) VPN services**

Moves to extend the company computer environment into workers' own homes, for the purposes of telecommuting, may employ leased lines, IP-VPN, or Internet VPN systems. Whilst Internet and IP networks provide the least expensive solution, they make it difficult to ensure security. For this reason, we see an important requirement for residential gateways which are safe and easy to use and incorporate reliable security functions. Other benefits can also be obtained by the user, for instance, if they employ telephone functions based on VoIP, then internal company lines can be used at a flat charge. An overview of such a system is shown in Fig. 2.

**(3) CTI (Computer Telephony Integration)**

For SOHO workers, skilful use of B to B and B to C electronic commerce is vital. Transactions with large-scale firms and the user's own firm or official bodies, as well as Internet purchases, are conducted mainly via the Web and e-mail, but by using a Web contact service which incorporates telephone and fax functions alongside Web functions, it is possible to achieve much deeper understanding between the communicating parties.

Moreover, using VoIP, computer and telephone systems can be handled as a single whole. These functions can be realized using computers only, but by appending

these functions to a residential gateway, we believe it is possible to achieve a more user-friendly service.

**Oki's product strategy**

Oki has started product development in two fields, to coincide with the emergence of IP telephony services as broadband communications filter through to the personal subscriber level. At present, Oki is involved in translating the excellent merger of telephone services we have achieved into a new range of products.

Below, we look at the product development history to date, and the future prospects.

**Product development history**

**(1) VoIP gateway for IP telephony**

Ahead of its competitors, Oki brought out the first commercial VoIP gateway in 1997 (see Fig. 3 for history of Oki's VoIP products). At the time, public broadband access was rare and VoIP was introduced with the main objective of reducing inter-office telephone charges for business. Yet, by 2001, with the spread of public broadband access, carriers were beginning to offer IP telephone services.

The VoIP gateway aimed at telecommunications

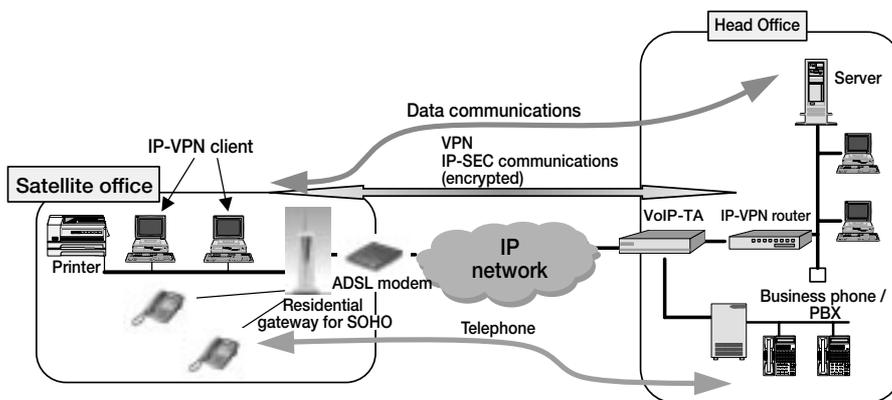


Fig. 2 Overview of VPN

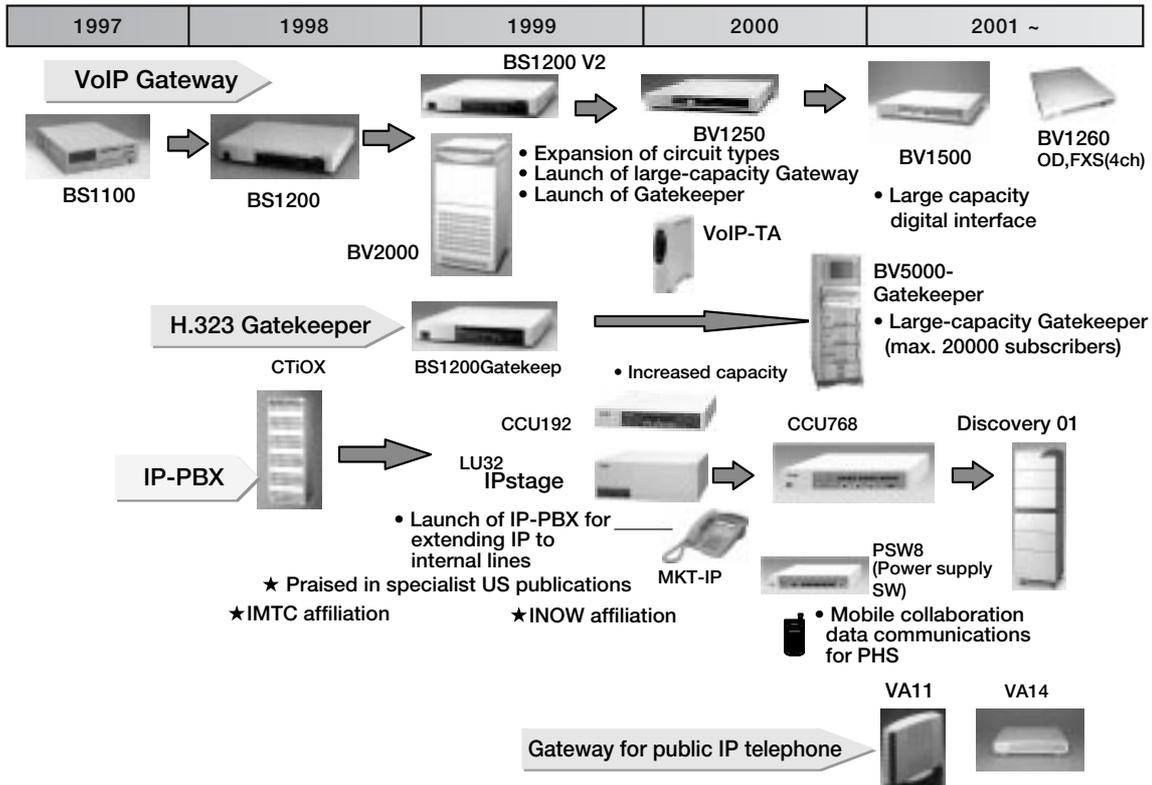


Fig. 3 Evolution of OKI's VoIP products

operators is based on a structure comprising elements with or without built-in ADSL modems, and both analogue and ISDN telephone interfaces, wherein incoming calls from the existing telephone network and outgoing calls of telephone numbers not serviced by the IP network are routed to the telephone network. A characteristic feature of the gateway is that it can be individually customized in order to supply the carrier's own particular network services.

Current products only provide VoIP gateway functions, but devices incorporating wireless LAN and routers for more convenient SOHO networking, and devices incorporating MPEG video services are expected in the future.

## (2) SOHO communications systems

With the co-operation of the Canon Sales Co., Inc., in 2001, we were able to steal a march on our rivals in marketing the canoLink4016ie<sup>\*3)</sup> which merges SOHO telephony and data communication via a wireless LAN (see Fig. 4 for product overview). Through this, the LANs for pushbutton telephone functions and data communication were integrated by a single wireless LAN, and a "no-wire" network was essentially achieved. The wireless LAN is based on IEEE802.11b, and the main unit has built-in access points for the wireless LAN.

In addition to standard telephone functions, wireless multikey telephones also allow simultaneous use of PCs,

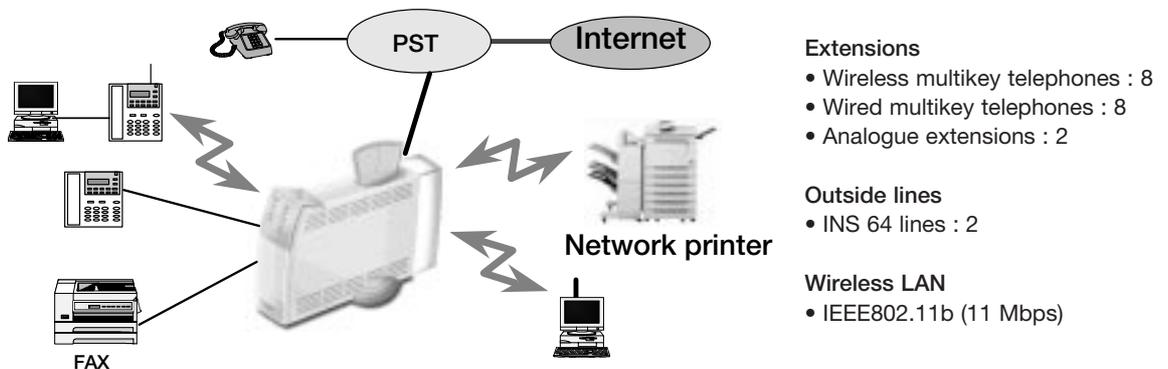


Fig. 4 Overview of information communications system for SOHO environment

\*3) "canoLink" is a registered trademark of Canon Inc.

printers, and data communications over the Internet, via the central unit.

This device is designed for a SOHO environment, but another product, the medium-capacity IPPBX (product name: IPstage), has also been developed to merge telephone and data communications. Merger solutions for telephone and data communications allow full and effective use of the CTI service functions illustrated in the service illustration, such as IP telephone, VPN services, Web contact linkage services, and the like.

From here on, we will continue to develop products with excellent usability, in line with the market trends in public networks and SOHO networks.

### Future trends

The elements identified as media for SOHO networks include : private PHS, wired LAN, wireless LAN, Home PNA, Bluetooth, PLC (Power line communication), and the like. Of these, we see wireless LAN and Bluetooth as the most likely players in the merger of telephone and data communications. Wireless LANs are simpler to implement than using 3rd generation cellular phones, and since they allow faster data communications, they are also attracting great interest in relation to public hot spot services. As and when products based on the IEEE802.11a and IEEE802.11g standards which permit 54 Mbps communications are released, in addition to the current mainstream standard of IEEE 802.11b for 11 Mbps communications, it will be possible to ensure a large number of channels for use in VoIP, and large-scale merger systems for telephone and data communications will be constructable. In addition, hot spots will be usable for telephone services.

Bluetooth, being based on radio waves, permits simultaneous transmission of both audio and data, which is a clear merit in terms of convergence between voice and data communications.

Furthermore, from a different perspective, introduction of IPv6 is necessary in order to truly expand into the mass user market. In the business world, conventional IPv4 networks are well established, and this situation may well present a considerable barrier to the shift to IPv6. Therefore, we envisage that IPv6 will spread first to household information appliances, whilst also being in high demand in the medium and small-business and SOHO sectors.

With the expansion of broadband, interest in residential gateways for SOHO environments has been growing. Moreover, as technological innovation progresses on the security front, with enhanced confidentiality and authentication features on the Internet, more user-friendly residential gateways will become possible. Oki is focussing on achieving a true merger between voice and data communications, by combining VoIP, wireless LAN and Bluetooth, and consolidating service functions for CTI applications, and the like, in order to achieve truly easy-to-use products for the SOHO environment. ◆◆

### References

- 1) Information Communications Statistics Database, Ministry of Public Management, Home Affairs, Posts and Telecommunications <http://www.johotsusintokei.soumu.go.jp>

### Author

Kenichi Yasuda : IP Solutions Company, IP System Planning & Development Div.

## TIPS

### Basic Glossary of Terms

**SOHO** : Abbreviation of "Small office Home office"

**VoIP** : Abbreviation of Voice over IP. Technology for transmitting voice over IP networks.

**IT** : Abbreviation of "Information Technology"

**IP telephone** : Telephony using VoIP technology

**CTI** : Abbreviation of Computer Telephony Integration. Technology which integrates telephony and fax into computer system.

**LAN** : Abbreviation of "Local Area Network"

**VPN** : Abbreviation of "Virtual Private Network". A service which enables a public circuit to be used exactly as if it were a private network.

**B to B** : Abbreviation of "Business to Business" commerce.

**B to C** : Abbreviation of "Business to Consumer" commerce.

**Web** : Standard document system used in the Internet and Intranets.

**MPEG** : Abbreviation of "Moving Picture Experts Group". Compression standards for video data.

**IPPBX** : PBX using VoIP technology.

**Home PNA** : Abbreviation of "Home Phoneline Networking Alliance". Industry group stipulating standard specifications for cheap and high-speed domestic LANs using existing phone lines.

**Bluetooth** : Wireless communications technology for portable information equipment formulated by an industry group led by Ericsson, IBM, Intel, Nokia, and Toshiba.

**IEEE 802.11a, IEEE 802.11b, IEEE 802.11g** : Standard specifications for wireless LANs stipulated by the IEEE.