

OKI MediaServer : Application Examples

e-Learning solutions based on an OKI MediaServer core

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Recent years have seen growing recognition of the importance of in-house training. With the progress of e-Learning technology, such as quantitative evaluation of training results, and standardization and refinement of training methods, e-Learning is being introduced into internal training schemes in an attempt to achieve efficient and effective staff education. Until now, e-Learning has centred on the use of text and graphics, rather than moving pictures, but with the improved power of modern personal computers (PCs) and the conversion of network infrastructure to broadband, e-Learning based on generous use of video images is now a real possibility. Most recently, attention has been focused on training using live pictures. The live picture delivery function of the OKI MediaServer uses its own built-in MPEG4 CODEC and is characterized by virtually zero delay time. In this paper, I will give an outline of the remote, live training solution, “@Training”, which makes full use of this feature, and introduce some application examples of “@ Training”.

Current state of in-house training

Over the past few years, there has been an increasing recognition at managerial level that in-house training is an indispensable element for continuing business success. Indeed, there are already concrete examples of enterprises 1) which have improved their results dramatically through the introduction of e-Learning. On the back of these success stories, we can expect e-Learning to play an increasing role in future in-house training set-ups. Here, “training” does not only refer to learning in the conventional sense of gaining business knowledge and breeding business skills, but also the development of information on new products, company policies, competition trends, and so on. For firms with branch sites distributed nationwide, it is especially important that corporate information is conveyed fully to the very furthest reaches of the company. For example, information that must be up to date, such as new production information, has to be distributed to branch sites as quickly as possible. Methods such as mail and fax may be used in this information flow, but they are not suitable in cases where the information must be transmitted slowly and carefully, in the style of a lecture. To convey this sort of information, in the past, the relevant staff have been divided up into different parties and given group training, or company instructors have toured different sites in order to train employees. However, this type of conventional training is

very expensive in terms of cost and time. As a result, it may not be possible to give full and thorough training, or to give the training at the right time, leading to the loss of business opportunities and giving rise to latent problems.

Re-evaluation of e-Learning

The idea of using computers in training is not all that new. Indeed, there have been any number of attempts to use computers for in-house business training, especially since the development of PCs, and some firms have already implemented e-Learning as part of these training schemes. Nevertheless, the format of these e-Learning systems has been based on the company creating its own training contents, distributing the contents to respective computers, and getting each trainee to study the material on their own. This makes these systems totally inappropriate for transmitting information that must be distributed rapidly to a broad range of people, as described previously.

Now, however, with the advances made in e-Learning-related technology and the consolidation of network infrastructure, the problems of past systems are being resolved.

Research into e-Learning methodology is making strides and effective training methods for human engineering are being established. e-Learning has also incorporated functions for verifying training results and functions for managing training history, including other types of group training (LMS : Learning Management System), which make it possible to implement in-house training in a systematic manner. With the introduction of these functions, e-Learning systems are attracting great attention from companies who see them as an effective tool for extending the potential capabilities of the business to the maximum.

The changing position of video images in e-Learning

As stated previously, e-Learning has not generally been based on the use of video images. This has been due partly to the inability of computer technology to handle video images, as well as the lack of sufficiently robust network infrastructure for video delivery. Video training systems using broadcast technology, such as satellite broadcasting, instead of computers, have been

used, but these set-ups lack the bi-directionality that is an advantage of computers, and they do not allow on-demand training which permits the trainee to proceed at his or her own pace.

2001 and 2002 saw major improvements in PC processing capacity and rapid consolidation of broadband environments, such as ADSL. These developments combined to create a situation where video-based e-Learning solutions could finally be studied.

It is common knowledge that, when transmitting information to people, the transmission effect increases in the order: text information – voice information – video information. For this reason, video has an enormous role to play in e-Learning, and particular importance is being attached to video image quality in applications for providing training rapidly to a wide spread of employees, as described above.

Video delivery technology in the OKI MediaServer

The OKI MediaServer has a CODEC based on the MPEG4 international standard specifications, and forms a video delivery platform that can be scaled up or down to suit any system from the smallest to the largest size. The functions of the OKI MediaServer can be broadly divided into the following three categories.

(Live picture delivery function) Encodes input video signals in real time and distributes them to multiple locations.

(Stored video delivery function (Video On Demand, or VOD)) A function for distributing stored video to multiple locations, on demand from the user. Allows the construction of a multi-server configuration, if required.

(PC conferencing function) A function for providing multipoint PC conferencing via a Multipoint Control Unit (MCU). Used in conjunction with the VOD and live picture functions.

In addition to these three core functions, the OKI MediaServer also includes peripheral functions, such as user management, billing management and copyright management, and is viewed very highly in all respects as a commercially usable video delivery platform.

In response to the increasing demand for video technology in e-Learning applications, we have developed a remote training solution “@Training” which applies the high quality video delivery technology of the OKI MediaServer.

@Training, a remote live training solution

“@Training” (“at training”) is an Oki solution which provides a network link between a single lecture transmission point and a number of different lecture receiving points, so that images of the instructor and training contents can be delivered as a live broadcast. This system uses the OKI MediaServer as the video delivery technology. By delivering the training contents via WBT (Web Based Training) technology, it is possible to provide fully Web-based lecturing, which includes the reception of video pictures and display of training materials.

The picture delivery studio uses professional cameras and other broadcasting equipment, which enable a rich variety of video pictures to be delivered to the user. On the trainees’ side, a projector, or the like, is used to display a large image of the PC video output, in a conference room or other type of hall which permits a large number of employees to receive a lecture simultaneously.

The network used may be the Internet or an intranet, and on the reception side, a low-cost broadband environment, such as ADSL, is set up. The transmit side (studio) uses a circuit which guarantees sufficient uplink capacity, such as FTTH. In order to provide a nationwide streaming delivery of video pictures output by the studio, a

delivery platform connected directly to the Internet backbone is provided. Fig. 1 illustrates a corresponding network configuration.

The “@Training” solution has the following key features.

- ① Since the remote training is centred on video pictures, it is possible to distribute high-quality information, including non-verbal information that is difficult to transmit via text or voice alone, quickly, to the furthest reaches of the company.
- ② The transmit side uses abundant broadcast technology to create impressive and appealing video images, with constant switching between a number of different cameras and materials videos.

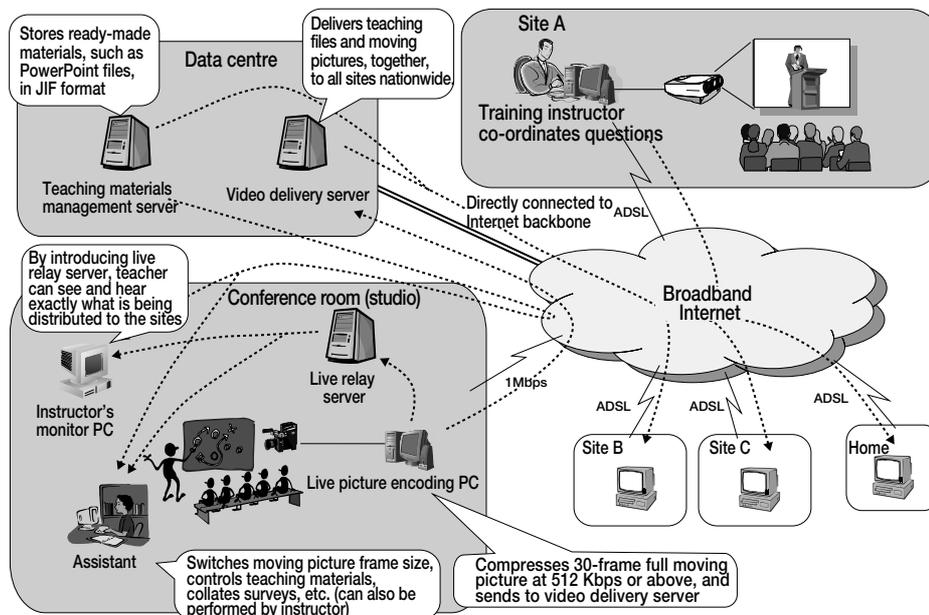


Fig. 1 Configuration of @Training Network

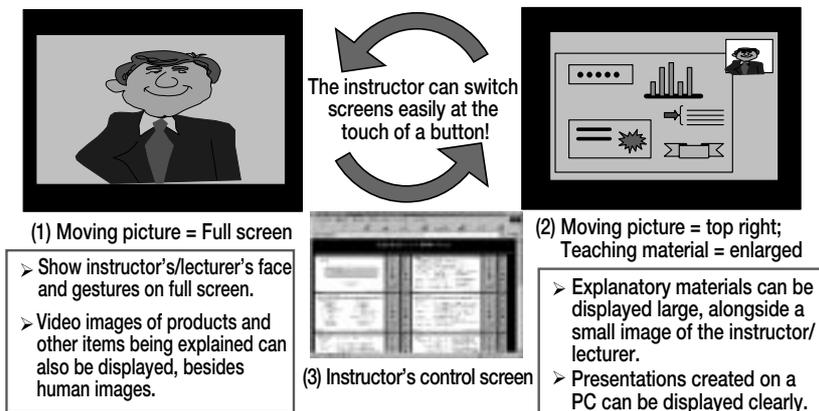


Fig. 2 Illustration of @Training screens

- ③ Since the transmissions are live, the instructor and trainees can hold direct question and answer sessions, by telephone, etc.
- ④ Trainees unable to attend a live transmission can view it at a later date, by VOD.

The functions of “@Training”

“@Training”, our remote live training solution based on video pictures, has the following functions.

- (1) **Live picture delivery function** : Live video pictures can be delivered simultaneously to many different points, with low delay time. In addition to a unicast which is transmitted to each separate location, it is also possible to transmit multicasts.
- (2) **Picture magnification and reduction function** : The instructor is able to switch between full screen display and minimized display of the video pictures shown on all of the trainees' PCs, by inputting commands via his or her own PC. (See Fig. 2)
- (3) **Teaching materials image switching function** : When the video image is minimized, a teaching materials image created in PowerPoint, for instance, can be maximized on the display. From his or her own PC, the instructor can change the materials images being shown on the trainees' PCs.
- (4) **Telephone conferencing function** : This function allows several trainees to take part simultaneously in a telephone discussion involving the lecturer. This can be used to provide real-time question-and-answer sessions.
- (5) **Annotation function** : When the instructor inputs text or graphics over the materials images, via his or her PC, the same text and graphics are displayed in real time on the materials images on the trainees' PCs.
- (6) **Raise hand / Questionnaire function** : This function allows trainees to transmit their opinions to the instructors, by a show of hands or questionnaire results, etc.
- (7) **Chat function** : All the participants can communicate with each other via text messages. This chat function can also be used by the trainees to ask questions

and by the instructor to respond to these questions.

(8) **Negotiation function** : When using Internet connections, there is a risk of instability in circuit quality. Therefore, in such cases, it is possible to adjust the streaming bit rate and frame rate, etc., in real time, in order that the video pictures are not cut off, or the like.

(9) **VOD function** : The lecture is recorded so that it can be played back to anyone at a later time, via an on-demand system.

Over and above these functions, we also plan to successively introduce features such as authoring tools for creating WBT contents, and compatibility with the e-Learning standards SCORM. The introduction of SCORM compatibility will make it possible to manage lecture attendance histories in combination with other training histories, through a SCORM-compliant LMS (Learning Management System), and this will in turn facilitate the integration of @Training into existing in-house training systems.

Application examples of “@Training”

“@Training” can be used in all kinds of organizations with a nationwide structure, be they business firms, corporations, public or government agencies, or any other type of body. Below, we give some application examples where this solution is particularly useful.

(Example 1) Family restaurant franchise chain

A family restaurant chain has opened up sites throughout the country and must ensure that the same high-quality food is served in each of their branches.

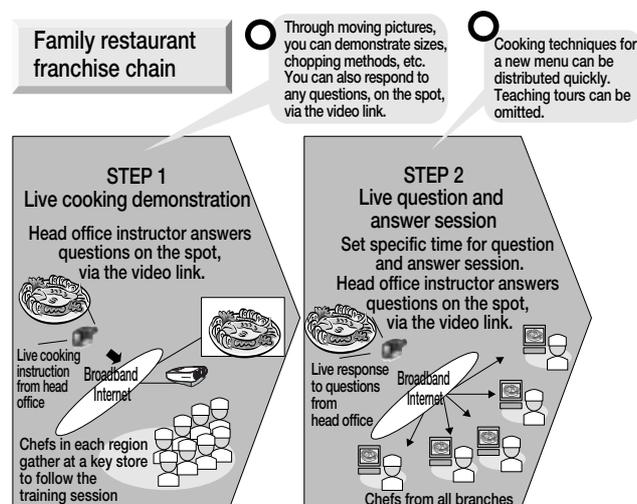


Fig. 3 @Training application example 1

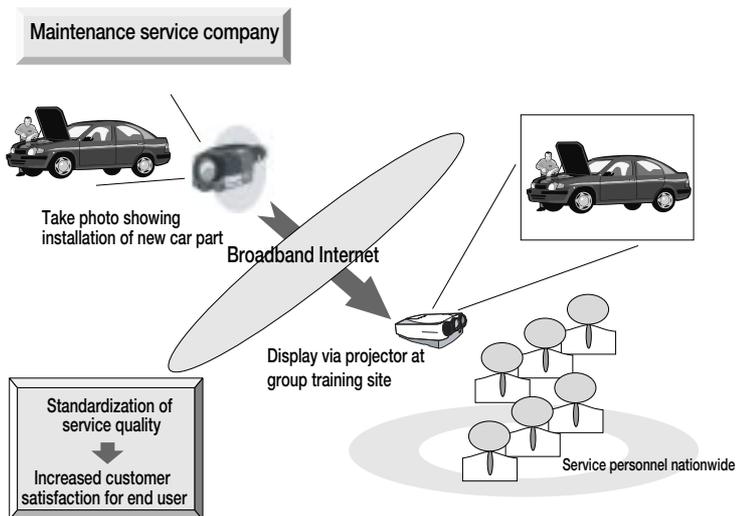


Fig. 4 @Training application example 2

this purpose, each time they release a new menu, they need to provide food preparation training to all of the stores in the chain, nationwide. In the past, they would have to organize many different recipe training sessions in each site, but by implementing @Training, they can introduce a new menu in record time (See Fig. 3).

(Example 2) Maintenance service company

A manufacturer's maintenance service company has service offices located throughout the country, and must be able to spread maintenance technology information for new products developed by the manufacturer, quickly and rapidly, to all the service offices nationwide. Traditionally, this would involve dividing the service personnel into various groups and calling them in to a training centre for separate courses, but technological skills tend to vary a lot and a great deal of time and effort is required to train all the staff to a standard level. However, by using the @Training solution, staff can attend classroom lectures beforehand, so that only service

personnel who have reached a prescribed level are called in for hands-on training. In this way, it is possible to reduce the time that the trainees spend away from their place of work (see Fig. 4).

Conclusion

This paper has introduced the remote live training solution "@Training". This solution not only enables remote training based on high-quality video images and helps to cut training costs; it also increases the speed of in-house information flows, and by convergence with knowledge management and information sharing functions, allows organizations to evolve towards an integrated enterprise information application solution. The next version of the OKI MediaServer is due to include MPEG4 ASP (Advanced Simple Profile) as its new CODEC technology. By applying this technology to the @Training solution, better training can be achieved through the supply of better quality video pictures. From here on, we will be aiming to develop products which create real customer satisfaction, as further improvements are made in video delivery technology and e-Learning functions are consolidated. ◆◆

References

- 1) "e-Learning, cost reduction efforts, IBM USA: Almost \$ 400 million last year", Nikkei Shimbun, 20th July 2002.
- 2) "e-Learning market survey results", 24/5/2001 Advanced Learning Infrastructure Consortium, <http://www.alic.gr.jp/activity/press/2001/010524.htm>

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TIPS

Basic Glossary of Terms

MCU (Multipoint Control Unit) : A module which controls exchange of video information and voice information between multiple terminals, when carrying out simultaneous multipoint PC conferencing.

WBT (Web Based Training) : A general term for e-Learning contents distributed over the Web. Allows easy unified management of contents, gathering of attendance history, results management, etc.

VOD (Video On Demand) : The supply of video streaming to a user upon request by the user, or a function for providing such a supply.

SCORM (Sharable Courseware Object Reference Model) : A reference model for sharable courseware objects. A standard format for defining e-Learning contents (including verification

tests), which have conventionally been supplied as a sequence of course units, in new sentence / paragraph units. XML is used as the description language. SCORM-compliant contents are distributed as separately purchasable components, with the aim of supplying a particular combination of components which match the trainees' needs.

LMS (Learning Management System) : An application which manages the learning history, attainment, etc. of e-Learning trainees. A SCORM-compatible LMS is able to interchange SCORM-compliant e-Learning contents from other companies.

ASP (Advanced Simple Profile) : One of the Profiles in MPEG4. With the MPEG4 SP (Simple Profile), it is difficult to improve picture quality above a prescribed bit rate, but the ASP allows high bit rate compatibility and permits handling of high-quality video images.