

SNEAK PREVIEW:

"Shaping the Future Mobile Information Society": Japan case study

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Chapter 4 (Excerpt)

JAPAN'S 3C'S: CARDS, CODES AND CHIPS

Chips

As mentioned in 4.1.2, microchip-networking technologies make up an important component of the government's R&D programme for the ubiquitous information society. Indeed, early manifestations of these types of technologies are already visible in Japan. NTT DoCoMo, for instance, has been fairly active in developing applications for radio frequency identification (RFID) tags.

RFID tags are essentially tiny microchips, some only 1/3 of a millimetre in diameter, that act as transponders (transmitters/responders), continuously waiting for radio signal to be sent by transceivers, or speciallydesigned RFID readers. When a transponder receives a certain radio query, it responds by transmitting a unique ID code. Most RFID tags are passive tags, that is to say they are not powered by any batteries. The most important functionality of RFID tags is the ability to track the location of the tagged item. RFID tags can cost as little as 0.50 US cents and the prices are dropping. Some analysts say that RFID will soon replace the familiar bar code in the retail world.

Since May 2003, NTT DoCoMo in collaboration with Tokyo's Academy Hills Library is testing an RFID library system in the trendy Roppongi Hills districtⁱ. Each one of the 12'000 books on the shelves of the Academy Hills Library contains an RFID tag on its binding. Each shelf is equipped with an RFID reader that can receive transmissions from books within 10-20 centimetres. Library users and staff are therefore able to locate books, even though they have been moved from their original position. Furthermore, checking out library books can be done quickly and efficiently using the RFID readers at the check-out desk.

This use of RFID tags at Roppongi Hills has now been expanded to retail shopping: the trial of NTT DoCoMo's "*R-click*" serviceⁱⁱ began on 1 November 2003 and will run until 1 February 2004. The R-Click service delivers information specific to a user's location using RFID tags. DoCoMo has issued about 4'500 RFID tags (embedded in small handheld terminals), which can be attached to users' mobile phones (see Figure 4.3). 200 stores are already on board for the trial. Subscribers can inform the network that they wish to be located by pushing a button, but the default setting is off. The small, handheld device then enables users to receive a wide variety of area information as they walk around the new metropolitan cultural complex of shops, restaurants, entertainment facilities, residences and hotels. Information will be transmitted to the user's i-mode phone in three ways:

1. Koko Dake (Area Limited) Click: While standing in any of approximately 10 to 20 areas (cells) in Roppongi Hills, the user can click the button on their RFID tag to receive information about that area. The user receives information tailored to their specific interests based on personal data that they pre-register.

2. Mite Toru (Watch and Receive) Click: When a user positions him or herself in front of an electronic board which shows commercials of products and services, the user can press the button on their RFID tag in order to receive information on their DoCoMo phone as well as URLs of products

and services shown in the commercial multimedia presentation. The feature also allows users to go to the web pages later, at their own convenience (See Figure 4.3).

3. Buratto (Walk Around) **Catch**: This feature automatically emails area information as it detects the user moving about Roppongi Hills. The user receives information before actually entering a new area, because the system anticipates the user's movements. The information can be customized to a user's specific interests.

Figure 4.3: Only an R-Click away in Roppongi Hills

R-Click terminal and "Mite Toru" board (left picture). Service logo on a sidewalk in Roppongi Hills (right picture)



Whether the RFID tag has been activated or not, it sends ID information to nearby readers every 0.7 seconds. For this reason, the place and the forward direction of a user can be calculated for the delivery timely and relevant services. The R-click Service is part of the e!Project of the Ministry of Economy, Trade and Industry (METI). NTT DoCoMo and the Mori Building in Roppongi Hills had made a joint proposal for the service to METI, which funds the e!Project with the aim to promote the wider use of advanced information communication technology in Japan.

RFID tags are also making their appearance in food establishments. Pintokona, a Sushi restaurant in the Roppongi Hills district, has introduced RFID tags to track and price their plates of sushi that are presented on a rotating belt. The system facilitates the calculation of the bill, as each tag contains information such as price, sushi type, chef, time stamp and other types of information. And as it can track the precise time when the sushi is placed on the plates, once a thirty-minute period has expired, the sushi is automatically removed from the rotating belt, in order to ensure that only the freshest pieces are made available to patronsⁱⁱⁱ.

Cards

In Japan, the use of integrated circuit (IC) cards has had notable success. IC cards (type C^{iv}), manufactured by Sony, under the brand name "Felica", are commonly used to ride the JR railway lines. In addition, ten million Japanese use Edy (euro dollar yen) prepaid cards. A number of telecommunication businesses are considering the use of IC cards in combination with mobile phones as a new business opportunity.

NTT DoCoMo and Sony announced a joint venture in October 2003 to promote the use of Felica cards with mobile technologies. And at ITU Telecom World 2003, NTT DoCoMo announced the 2004 launch of mobile phones with integrated circuit cards, namely Sony's "Felica" card. This will enable mobile phone users to utilize their mobile phones as tickets or cash for services such as public transport, concert tickets and so on.

The SIM (subscriber identity module) card embedded in GSM mobile phones will also be subject to significant evolution. The new 3G version of the SIM card known as the UIM (universal identity module) will be incorporated into mobile phones with security measures such as PKI (public key infrastructure). This will enable secure user authentication, allowing for a wide variety of content to be stored on the mobile phone in the future, such as pre-paid coupons or credit card information as well as roaming information.

Codes

Not only are chips and cards finding their way into Japan's mobile phones, but two-dimensional (2D) code readers are also being explored. The new Quick Response Code (QR Code) is a 2D code developed by DENSO Corporation.

Figure 4.4: Quick response for Mobile Phones
Image of a 2D quick response code to be read by mobile phones
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Source: NTT DoCoMo

It allows for the fast reading of large amounts of alphanumeric data: a QR code can contain up to 7'366 characters of numeric data and 1'888 Japanese characters, thereby enabling it to display to same amount of data smaller area than conventional bar codes (See Figure 4.4). NTT DoCoMo has already released two models with code readers, the Fujitsu 505 series and the Sharp 505 series. For a phone to be able to read the 2D code, it requires a 1 mega

pixel digital camera and the appropriate software. From 2004 onwards, all of NTT DoCoMo's mobile phones will be 2D-code compatible. Codes will begin appearing on all kinds of products, such as newspapers, artwork, retail goods, foods and so on. By reading the code with their mobile phone, users will be able to download additional information about the product. In the early days, only text will be made available, the 2D codes will be static and off-line. But dynamic on-line 2D codes will be available shortly, embedding hyperlinks and multimedia content. This is likely to further transform the way in which the Japanese use mobile phones. There are currently 500'000 terminals with the appropriate software and camera capability in circulation, and DoCoMo estimates that the development of a mass market for 2D codes is not far off.

The 2D code reader may be a first step towards the ubiquitous communicator or "U-Code" (see Figure 4.5) being developed by Japan's Ubiquitous Networking Laboratory and discussed below in section 4.2.6.

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Full case study to be released in January 2004 - check www.itu.int/futuremobile

ⁱ For more information about the Roppongi Hills district, go to http://www.roppongihills.com/en/information/index.html

ⁱⁱ To sign up for the service, users can go to <u>http://r-click.jp/</u> (Japanese only).

iii See <u>http://2.pro.tok2.com/~higashi-nagasaki/anti/pintokona.html</u> for pictures and text (Japanese only). See also <u>http://urawa.cool.ne.jp/vfsarah/kaiten2_pinto.html</u>.

^{iv} Integrated circuit cards come in three main formats: type A, B and C. Type B is popular in Europe whereas Type A is more popular in the United States. Type C is being used in Hong Kong, Singapore and Tokyo. In these three cities, there are over 30 million such cards in circulation.