

Deploying Transport IC Card in Hiroshima Urban Area

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Introduction

Hiroshima Prefecture's PASPY transport IC card entered service on 26 January 2008, featuring high processing speeds plus the inherent convenience of IC cards. However, it also has unique features not found in IC fare cards used elsewhere. One is the so-called 'one-way interoperability' with JR West's ICOCA IC card, meaning ICOCA users can use the PASPY system, but PASPY cannot be used in the ICOCA area. This method may be attractive to other cities in a similar situation to Hiroshima where nationwide IC fare card services are provided by an operator in the JR group (ICOCA for Hiroshima), and attempting full two-way interoperability with IC fare cards like ICOCA that have wide service areas would probably make it difficult to implement original services, such as 10% fare discounts. Conversely, a completely independent IC fare card system would probably be inconvenient for users, particularly those visiting from other areas. As a result, one-way interoperability seemed like an ideal solution considering the advantages and disadvantages.

Another unique PASPY feature is that although it is centred on railway and bus operators, use is also envisioned by a range of other transport modes, including ferries and ropeways, as symbolized by the logomark pictograms. Significantly, this service also incorporates a bus commuter pass (scheduled for FY2008) while complying with the Cybernetics Standard established by the Congress of Japan Railway Cybernetics. Japan's first implementation of a FeliCa card with 8-KB capacity unlike the normal 4-KB capacity, was for the purpose of achieving bus pass service, and the

situation of transport in urban Hiroshima is behind the need for the extra capacity.

Public Transport in Hiroshima Urban Area

Hiroshima City and surrounding areas are home to about 1.5 million people and it is the Chugoku regional hub. It also has two UNESCO World Heritage sites—the Hiroshima Peace Memorial and Itsukushima Shrine—attracting visitors from around the world.

Unusually for a Japanese city of this size, Hiroshima has no metro and the population relies on trams and buses for urban transport; the trams carry some 150,000 passengers every day. The Hiroshima Bus Center at the heart of the city centre has more than 1500 daily bus departures for destinations in Hiroshima Prefecture. About 170,000 passengers ride the city buses every day and all buses running in the city are operated by 10 or so large and small private companies.

JR West's railway lines centred on Hiroshima also support intercity transport. Hiroshima Station is a San'yo Shinkansen stop and other lines extend in five directions carrying about 70,000 departing passengers every day. However, because the JR West lines do not pass through Hiroshima's business and commercial centres, many rail passengers must transfer to trams and buses to reach their final destinations. Hiroshima also has the ASTRAM Line, a new transport system that opened on 24 August 1994, and many ferries run to Miyajima and other islands in the Seto Inland Sea.

As is clear from this description, railways and metros are not the main form of public transport in urban Hiroshima unlike other major Japanese cities. Instead, the various modes are centred on buses. There are also many operators, which are mostly private corporations. Obviously, the PASPY technology had to be designed to support these unique features.

Background to PASPY Introduction

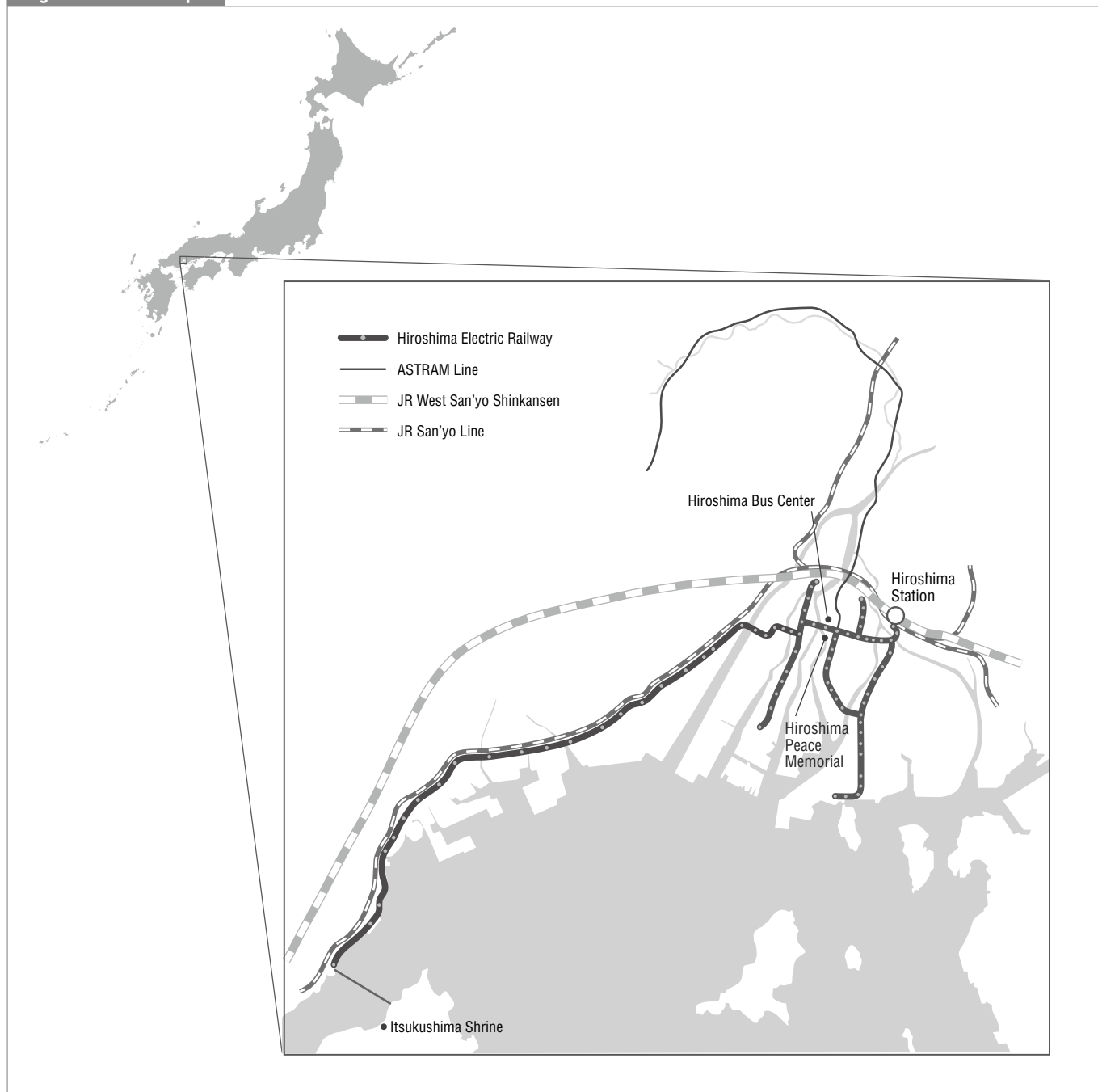
A magnetic fare card for use on buses of six companies was introduced in Hiroshima in 1993. Today, that card can be used on about 10 bus companies as well as on trams and some ferries. These magnetic cards are popular in Hiroshima where



PASPY

Logomark

Figure 1 Route Map



it is common for several bus companies to operate routes in the same direction because—unlike commuter passes—they can be used on buses of any company, so close to 60% of passengers use magnetic fare cards currently.

However, because more than 10 years have passed since the card introduction, more card readers are failing with age-related wear and tear, causing problems with ticketing. In addition, the nationwide popularization of IC cards has created a relative decline in the perceived service value of magnetic cards. As a result, Hiroshima started examining introduction of an IC card system.

The basic idea was to try to keep the current scheme

while making a few changes and creating links with JR West. Under that current scheme, each company issued cards and fare revenues were settled between the operators. Similarly, with the new system, eight cards are issued with the PASPY function, marking the first time in Japan that so many cards have been issued for one IC transport card. Also, the companies settle accounts with each other monthly, rather than using a clearing company to pool and divide received fares. Although this type of scheme is unusual and involved initial extra costs, it keeps long-term operation costs down.

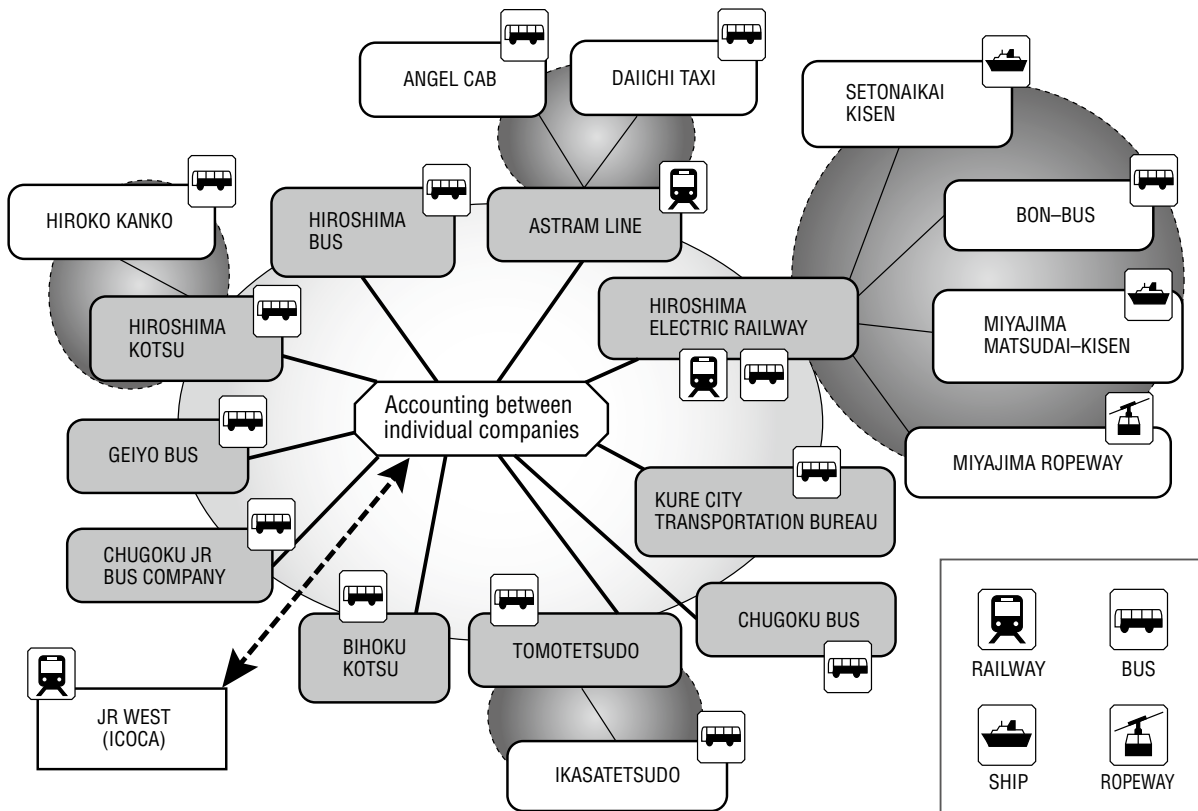
Furthermore, under this scheme, transport operators are separated into 'card issuing operators' and 'card using

Figure 2 Characteristics of PASPY

- Many types of cards



- Accounting between individual companies



operators'. Issuing operators can issue cards in their own corporate colours. Using operators don't have their own cards but have a contract with an issuing operator that also handles the accounting. Using operators can minimize initial expenses by not needing to have card-issuing terminals and other infrastructure, allowing even smaller operators to join the system and contribute to expansion of the service area. Plans envisage most transport modes in Hiroshima (except JR West lines) using PASPY by the end of FY2009. As a result, PASPY is expanding further than the previous conventional magnetic fare card service and is expected to grow into a broadly used service in Hiroshima Prefecture.

8-KB FeliCa Card for Bus Commuter Pass

Another basic idea of PASPY is linkage with JR West. To achieve this aim, PASPY is compliant with the Cybernetics Standard. This standard is already in wide use and compatibility may even be possible with future unification of IC card standards. However, a major problem with bus section commuter passes was discovered when considering bus services as a priority.

Usually, bus section commuter passes have far more complex rules than railway commuter passes. For example, new stops can be set and routes can be eliminated and consolidated much more easily than railways. While this

flexibility is a merit of buses, the number of special rules for commuter passes increases every time a change is made. Consequently, supporting rules created over a 30-year period requires cards to 'learn' the stops where passengers get on and off. However Cybernetics Standard-compliant IC cards had insufficient free memory to record all this information.

The problem has been overcome using new FeliCa cards with 8-KB of memory, which is twice the previous size, making bus section commuter passes with PASPY feasible. This service is scheduled to start in FY2008.

This will be the first deployment of 8-KB cards in a transport application and implementation of other new services making use of the large capacity is being studied.

Future Plans for PASPY

PASPY is still a service under development. Consequently, future plans are not fixed but a coming addition is topping-up the stored fare using bank ATMs. This will be achieved with the cooperation of local banks, providing some 200 more locations for adding stored fare.

Unlike railway operators, bus operators have few fixed facilities, so there are almost no locations to install machines to top-up stored fare. Currently, Hiroshima has only 30 such locations, meaning that top-up on the bus is the main method. However, this requires intervention by the bus driver, limiting the speed of top-up and possibly increasing the

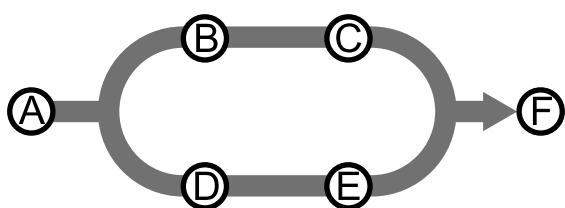
risk of accidents. Securing places to top-up fares outside buses is a challenge, so the ability to use bank ATMs in shopping centres, hospitals, and other places will be a major convenience for users.

Introduction of PASPY to Hiroshima Electric Railway is seen as a major step in the modernization of trams, which have been the focus of renewed attention in Japan recently. Detailed specifications are still being considered, but plans are to make trams an attractive service with the aim of rejuvenating public transport and reversing the decline in use. ■



Hiroshima Electric Railway Green mover max ultra-low-floor tram

Figure 3 Bus Section Commuter Pass (Example)



Example: Route from A to F separated into two different paths

Possible patterns for passengers with passes from A to F via B are:

- Cannot use buses via D
- Can use buses via D if do not get off at D or E
- Can also get off at D and E

The pattern is determined by issues such as characteristics of the route, so rules cannot be judged by a simple program.

In reality, there are routes with three or more paths and many rules that only apply to certain stops.



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