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# Backup and Restore Method for Ubiquitous Devices

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## Agenda

- 1 Background
- 2 Backup and Restore Method
- 3 Summary and Future Work

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## 1. Background

- Ubiquitous and IC Card
- Ubiquitous Service

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## 1.1 Ubiquitous and IC Card

Ubiquitous: information seems to be everywhere

20th  
uniformity  
mass marketing  
mass sale  
mass production

21st  
diversity: "person"  
condition 1  
condition 2  
condition 3  
condition 4  
context aware marketing  
diversity of channel  
diverse production

Diversity of needs

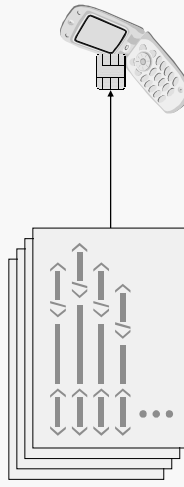
Marketing of person, product, information in spite of time and place

IC Card is a key device of ubiquitous information society

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## 1.2 Ubiquitous Service

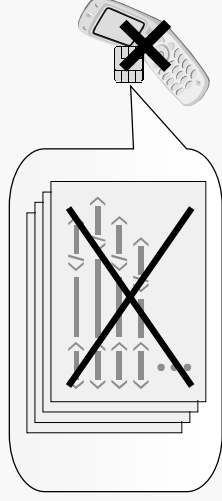
- Information data
  - Goopas (Odakyu Electric Railway '03/02/17-)
  - Mobile Information Delivery Service with ticket gate
  - Information are sent by E-mail within 20 secs after passing ticket gate
- Train Ticket, Electronic Money, etc.
  - Mobile Suica (East Japan Railway Company, NTT DoCoMo Inc. and Sony Corporation; January 2006-)



Various data will be storing at one Ubiquitous device.

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## 1.2 Ubiquitous Service



When the device is lost, broken or stolen, its stored data MUST be recovered.



**Backup and Restore Method  
Flexibility & Cost**

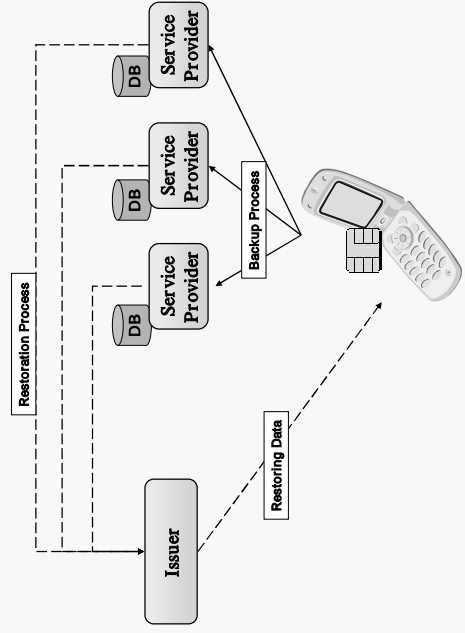
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## 2. Backup and Restore Method

- Current Method
- Our Method

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## 2.1 Current Method

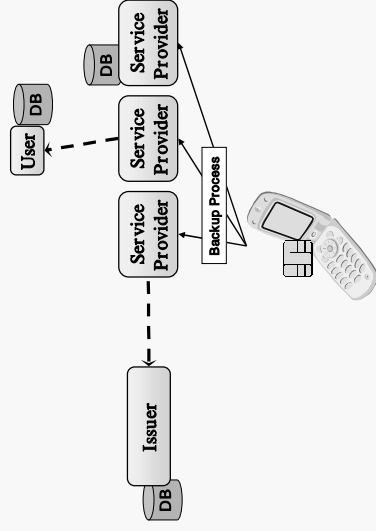


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## 2.1 Current Method

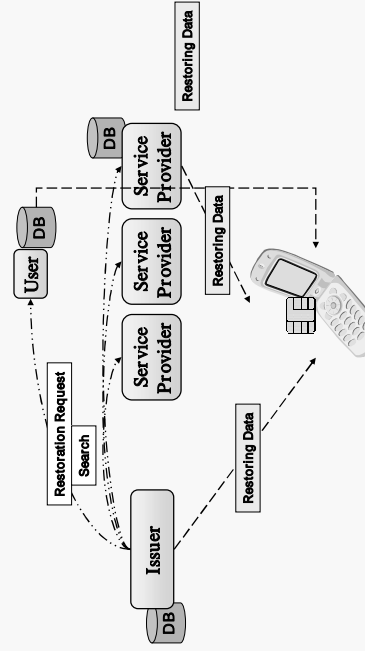
- CAN simplify the system configuration.
- CAN execute backup and restoration by low communication cost.
- However,
  - Backup-data management workload of Service Provider is large.
    - Every Service Provider MUST manage a database for storing backup data.
  - The method may not maintain confidentiality of backup-data.
    - The Service Provider CANNOT restore its data.
  - The method CANNOT execute backup according to device life cycle.

## 2.2 Our Method



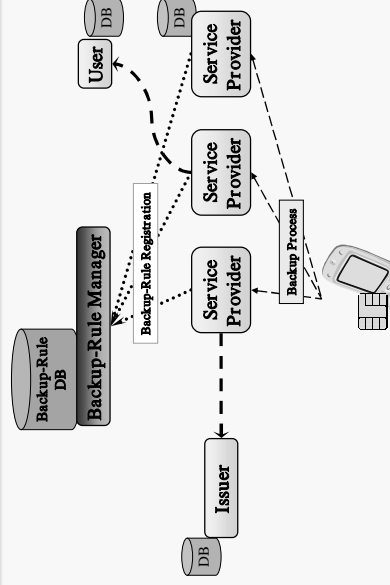
The Service Provider CAN consign its workload to other entity

## 2.2 Our Method



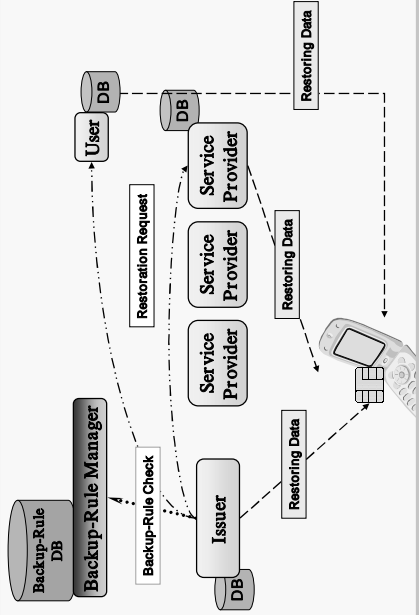
The Issuer MUST search the entities preserving the distributed data

## 2.2 Our Method



All Service Providers register Backup-Rules of their data with Backup-Rule Manager.

## 2.2 Our Method

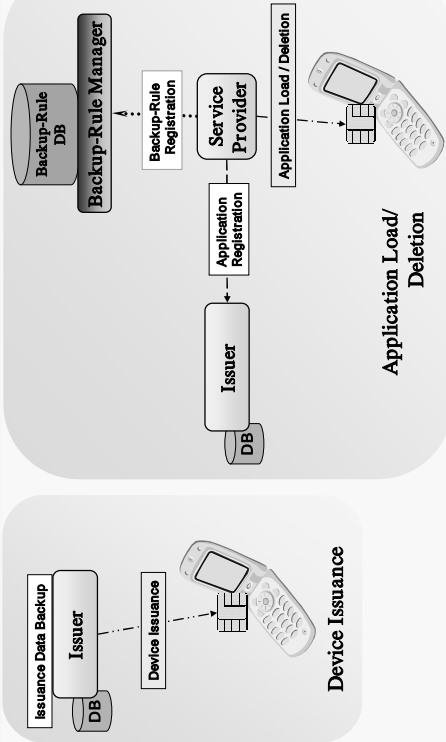


The Card Issuer CAN collect the distributed data without searching

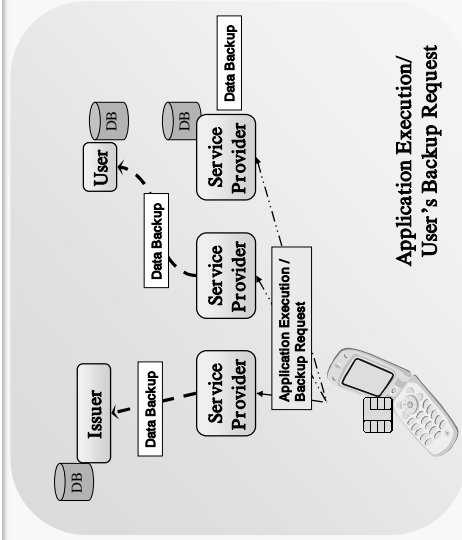
## 2.3 Device Life Cycle & Backup Timing

- Device Life Cycle
  - Device Issuance
  - Application Load/Deletion
  - Application Load/Execution
- Backup Timing
  - Device Issuance
  - Application Load/Deletion
  - Application Load/Execution
  - User's Backup Request

## 2.4 Backup Timing



## 2.4 Backup Timing



### 3 Summary and Future Work

- Develop backup and restoration method for an Ubiquitous device
  - Flexibility
    - The Service Provider CAN select the entity where it wants to save backup data.
  - Cost
    - Our method CAN reduce communication cost of backup and restoration.
- Future work
  - To confirm the feasibility of our method toward prototype development