

The PRT Project

Phase 1 Design & Engineering

Ticketing System for PRT



Title/Name of delivery:	Ticketing System for PRT
Document ID:	1-BCD-3-15-1.0
Version:	1.0
Date:	23.04.2003
Company:	POSDATA Co., Ltd
Author:	Joo Yeol Kim
Approved by:	Seung Yoon Oh/Erik Hardeng
Security:	Confidential

CONTENT

1 EXECUTIVE SUMMARY	3
2 SYSTEM CONFIGURATION	4
3 THE DETAILS OF PROPOSED SYSTEM	5
3.1 TICKET	5
3.1.1 <i>Brief introduction</i>	5
3.1.2 <i>Ticket Types</i>	5
3.1.3 <i>Classification of Ticket Issuing Equipment</i>	5
3.1.4 <i>Card Dimension</i>	5
3.2 TICKET VENDING MACHINE (TVM).....	5
3.2.1 <i>Brief introduction</i>	5
3.2.2 <i>Schematic Diagram</i>	6
3.3 RECHARGING MACHINE	7
3.4 CENTRAL VENDING MACHINE.....	8
3.4.1 <i>Feature</i>	8
3.4.2 <i>Schematic Diagram of Central Vending Machine</i>	9
3.5 TICKET VALIDATION SYSTEM	9
3.5.1 <i>Schematic Diagram</i>	11
3.6 STATION SUPERVISORY SYSTEM	11
3.6.1 <i>Brief introduction</i>	11
3.6.2 <i>Function</i>	12
3.6.3 <i>Schematic Diagram</i>	12
3.6.4 <i>Communication of Station Supervisory System</i>	13
3.6.5 <i>Reports of Station Supervisory System</i>	13
3.7 CENTRAL COMPUTER SYSTEM	14
3.7.1 <i>Function</i>	14
3.7.2 <i>Configuration</i>	15
4 CONCLUSION	16

1 Executive Summary

A purpose of the proposed Ticketing System is to provide passengers with the convenient operation of ticketing process. With automatic management and analysis of the fare incomes and the quantities of passengers, it can achieve the load balance of PRT service route. Finally it could be the basis of driverless operation of PRT system. The proposed Ticketing System is made of the proven technology in MRT and LRT, and the new application is added.

The Ticketing System has four major parts.

Central Computer System

Central Computer System is installed in main control center and is composed of Central Computer, Operator Workstation System (OWS), Maintenance Workstation System (MWS), and Central Vending Machine.

Station Supervisory System

Station Supervisory System is installed in control office of each station, functioning as an interface unit between the Central Computer System and the local equipments.

Local Equipments

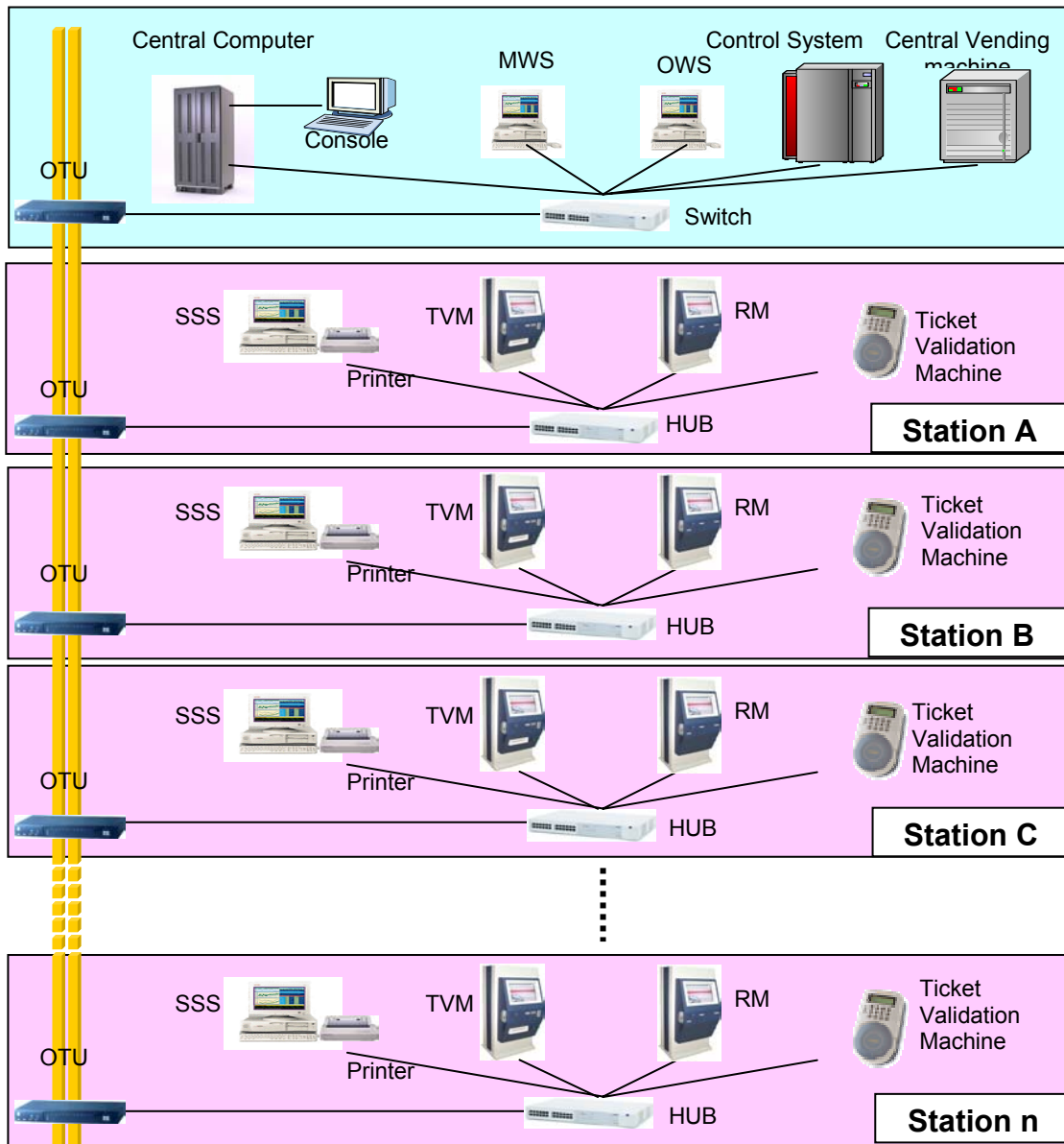
Ticketing Equipments are located in station and platform, composing of Ticket Vending Machine, Recharging Machine, and Ticket Validation Machine.

Ticket

Applicable tickets in PRT system could be single ride ticket, season ticket and test ticket.

2 System Configuration

The proposed Ticketing System is configured as shown below:



RM : Recharging Machine
SSS : Station Supervisory System
OTU : Optical Transmission Unit

MWS : Maintenance Work Station
OWS : Operator Work Station

3 The details of proposed system

3.1 Ticket

3.1.1 Brief introduction

The contact-less RF cards could be applicable to PRT system. The Ticket Vending Machine issues a ticket with the imbedded information in IC Chip.

3.1.2 Ticket Types

- (1) Single Ride Ticket
- (2) Period Ticket
 - Daily Ticket
 - Season Ticket
- (3) Special Purpose Ticket
 - Test Ticket
 - Staff Ticket

3.1.3 Classification of Ticket Issuing Equipment

Classification	TVM (Single Ride)	TVM (Period)	Recharging Machine	Central Vending Machine	Remarks
Single Ride Ticket	✓			✓	
Period Ticket		✓		✓	
Test Card	✓	✓		✓	
Staff Card				✓	

3.1.4 Card Dimension

85.6mm×54mm×0.76mm (Credit Card Size)

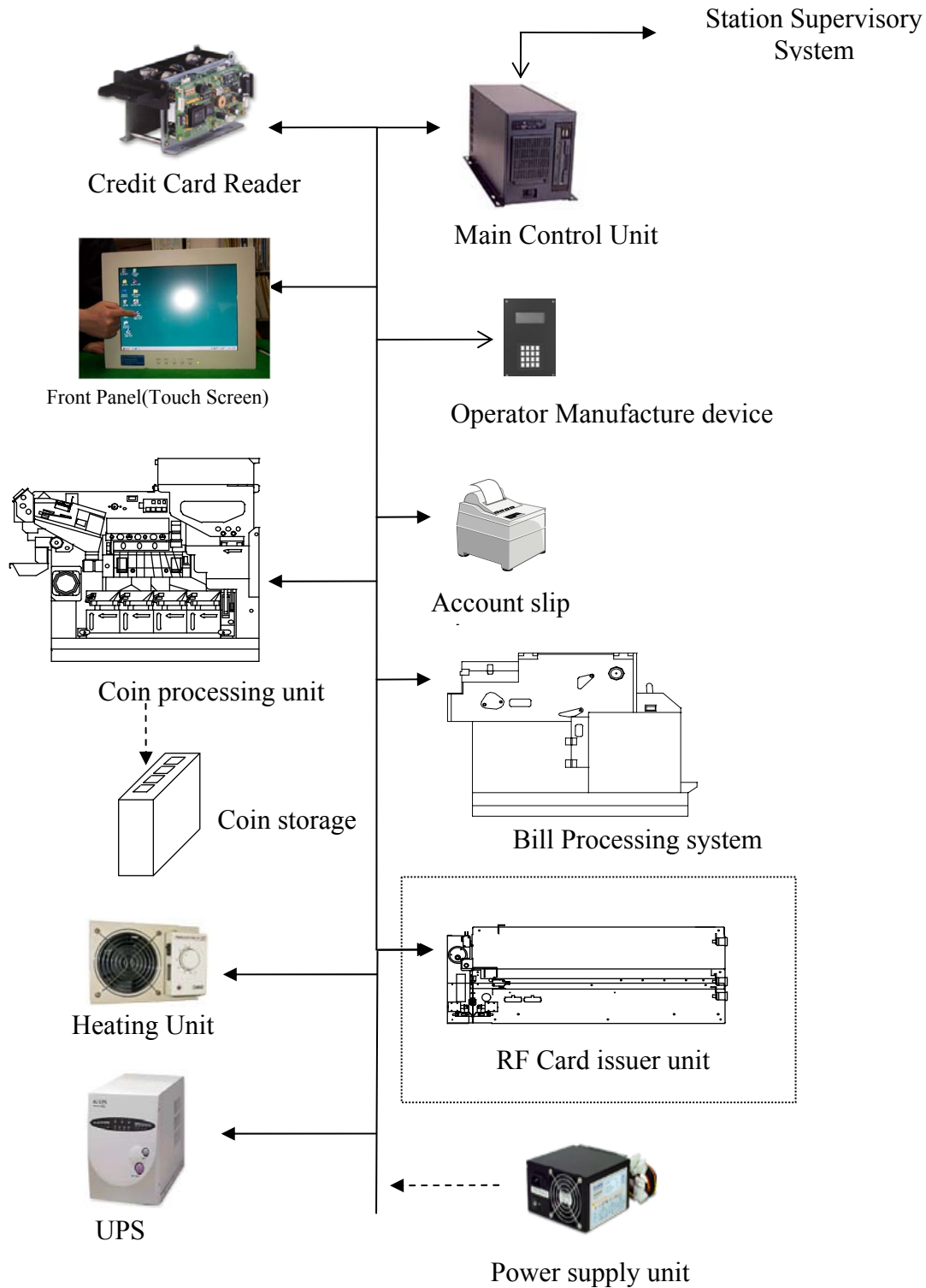
3.2 Ticket Vending Machine (TVM)

3.2.1 Brief introduction

A passenger can purchase a ticket through TVM, available on coin, bill and credit card. The TVM is able to issue various tickets with the button selection. The front panel could be designed with human technology and operation convenience.

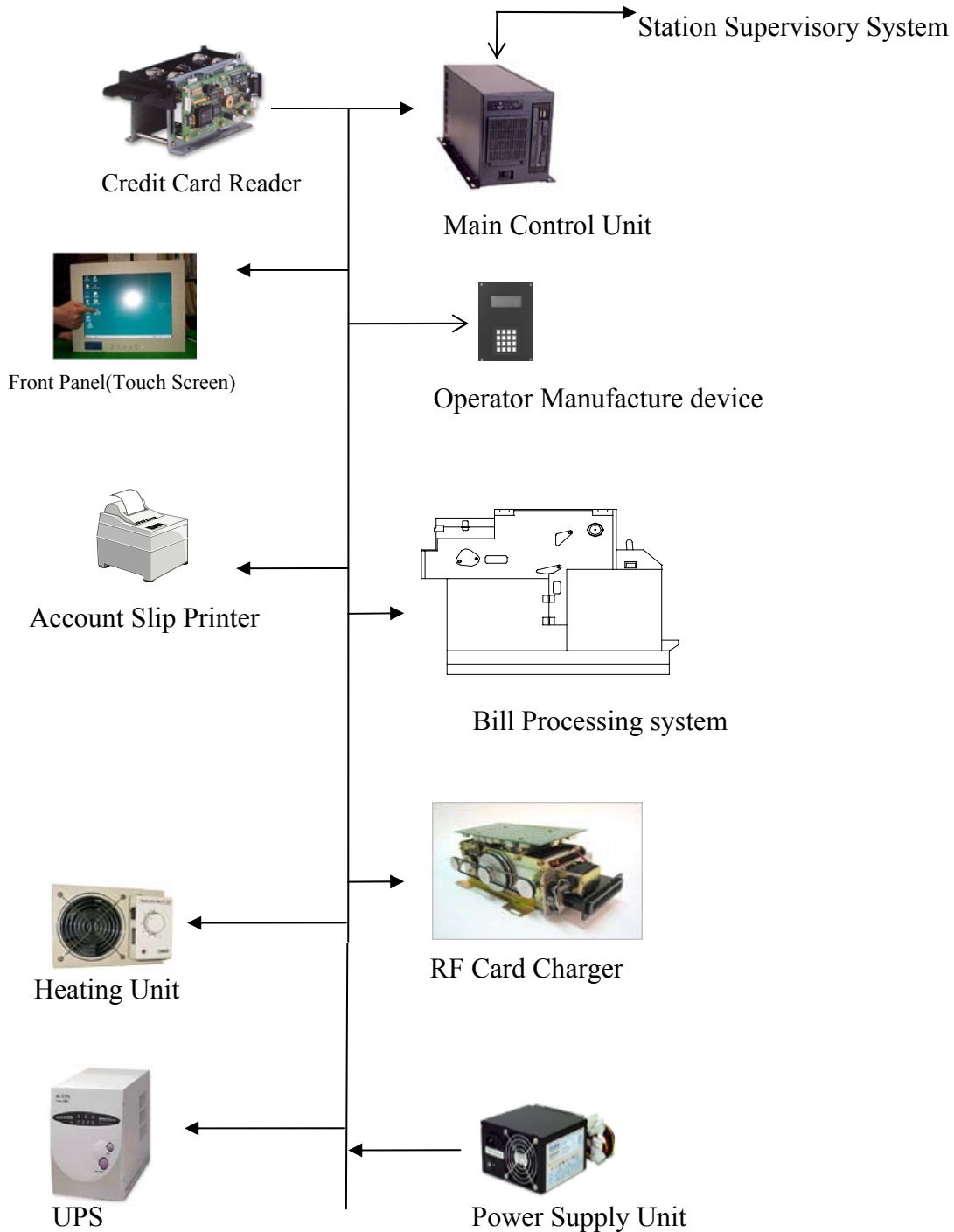
- ✓ TVM could be available on both ticketing methods:
 - Select First: After selecting the button of ticket type, a passenger pays the cash or credit card according to the displayed fare indicator.
 - Pay First: After inserting a cash or credit card, a passenger selects a ticket.

3.2.2 Schematic Diagram



3.3 Recharging Machine

Once purchasing a ticket, the ticket can be recharged by Recharging Machine with paying cash or credit card.



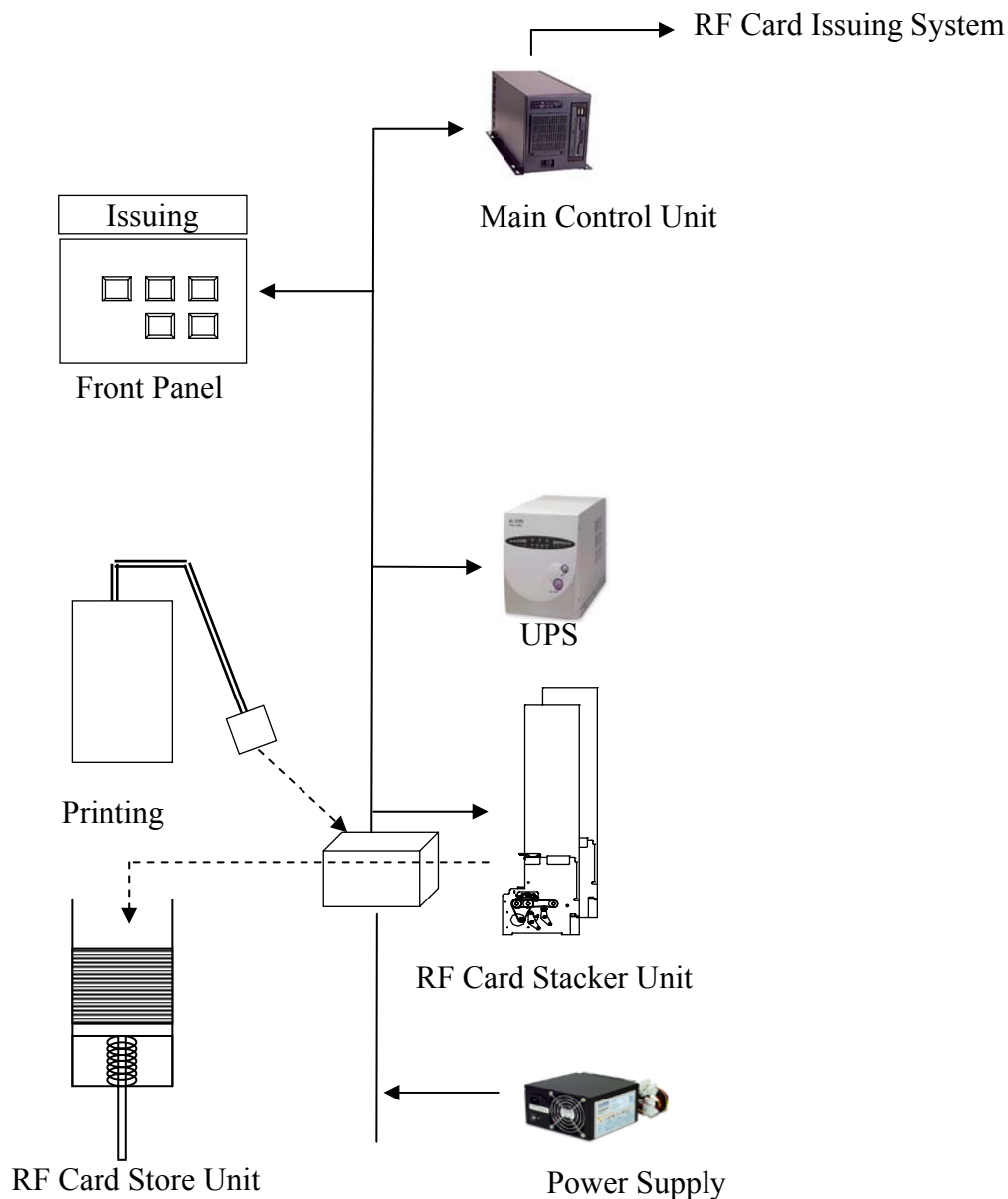
3.4 Central Vending Machine

Central Vending Machine issues all types of tickets by operator request, and it gives an initial data to the ticket before being used in TVM.

3.4.1 Feature



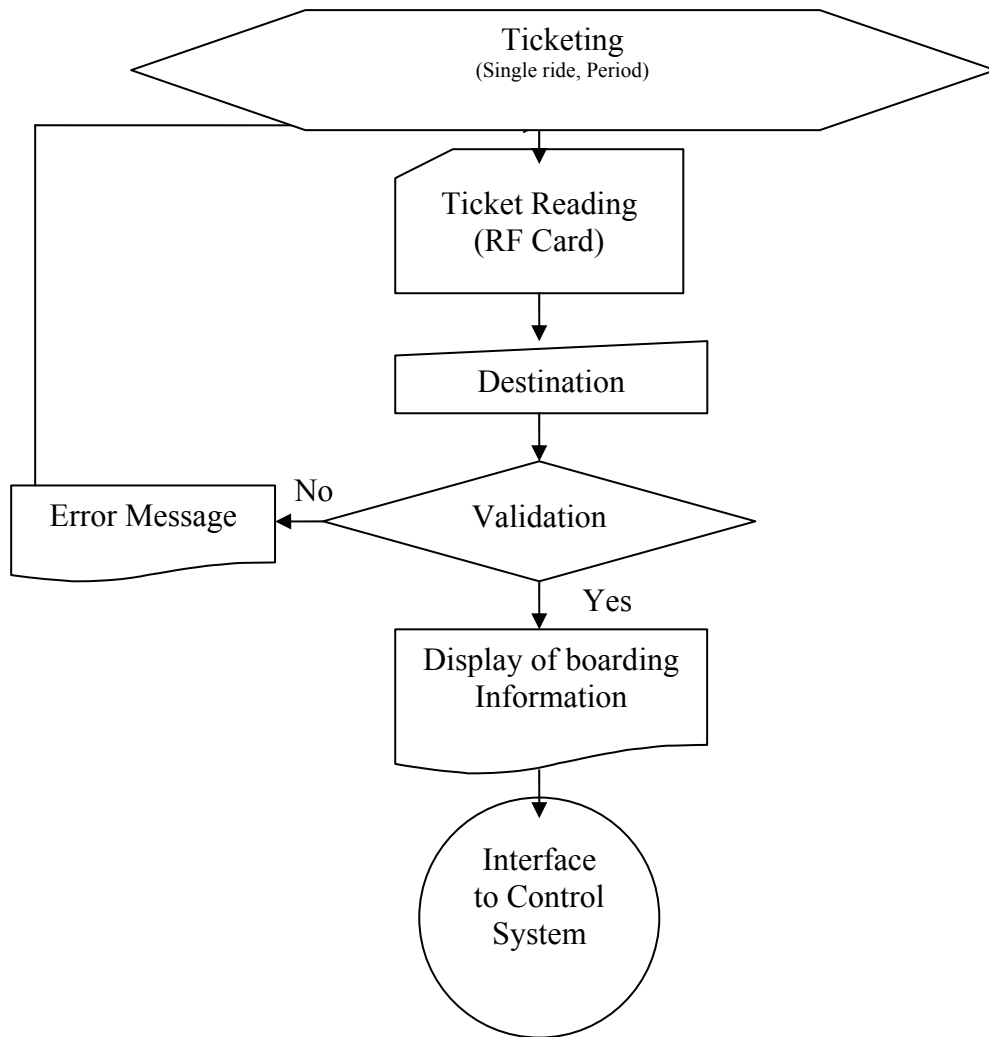
3.4.2 Schematic Diagram of Central Vending Machine



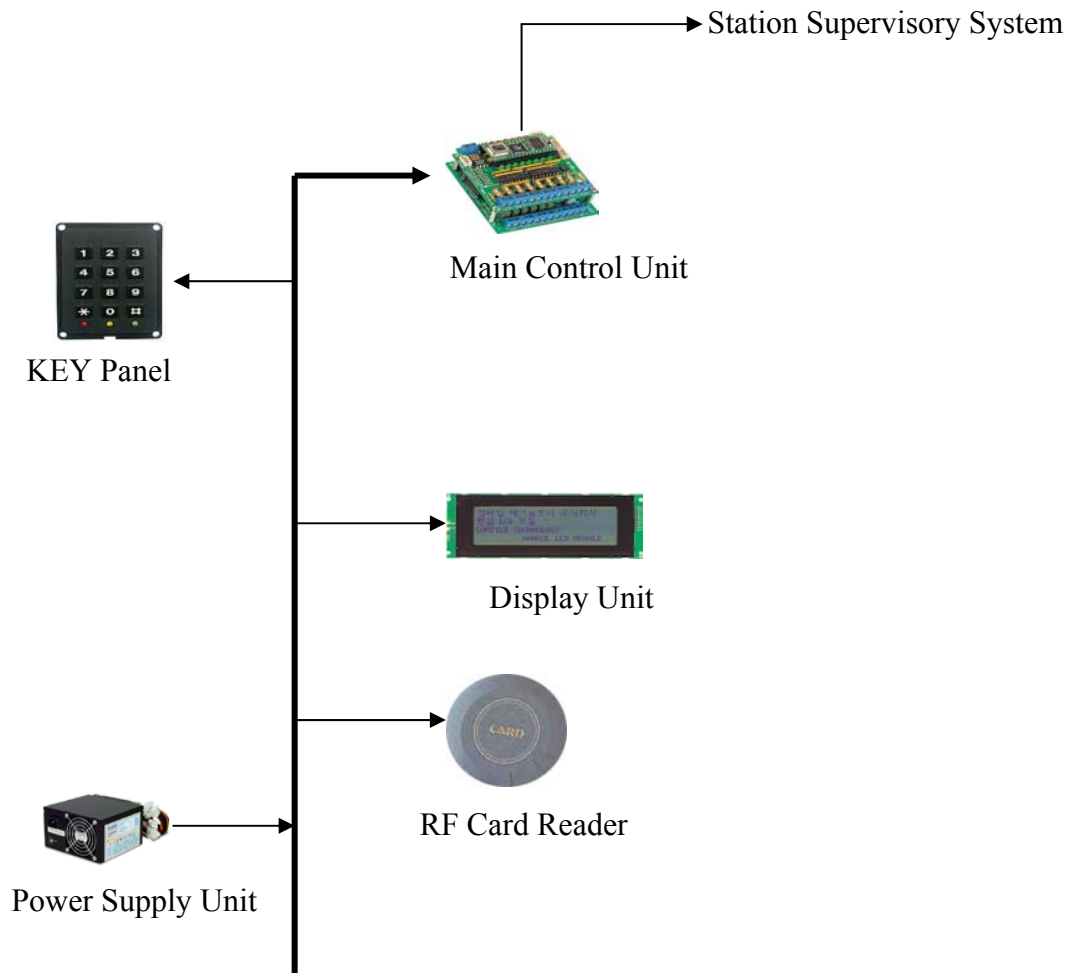
3.5 Ticket Validation System

Ticket Validation System could be used for calling a vehicle and pre-paying for the ride. Because this system could be operated with Control System, further detail discussions are required.

The following diagram shows an example of ticket validation process. After purchasing a ticket, passenger moves to the platform for the ride. Once reading RF-Card, the valid travel section is displayed on the board. After selecting and confirming the destination through push button, the related information is registered and the vehicle destination is transmitted to the Control System.



3.5.1 Schematic Diagram



3.6 Station Supervisory System

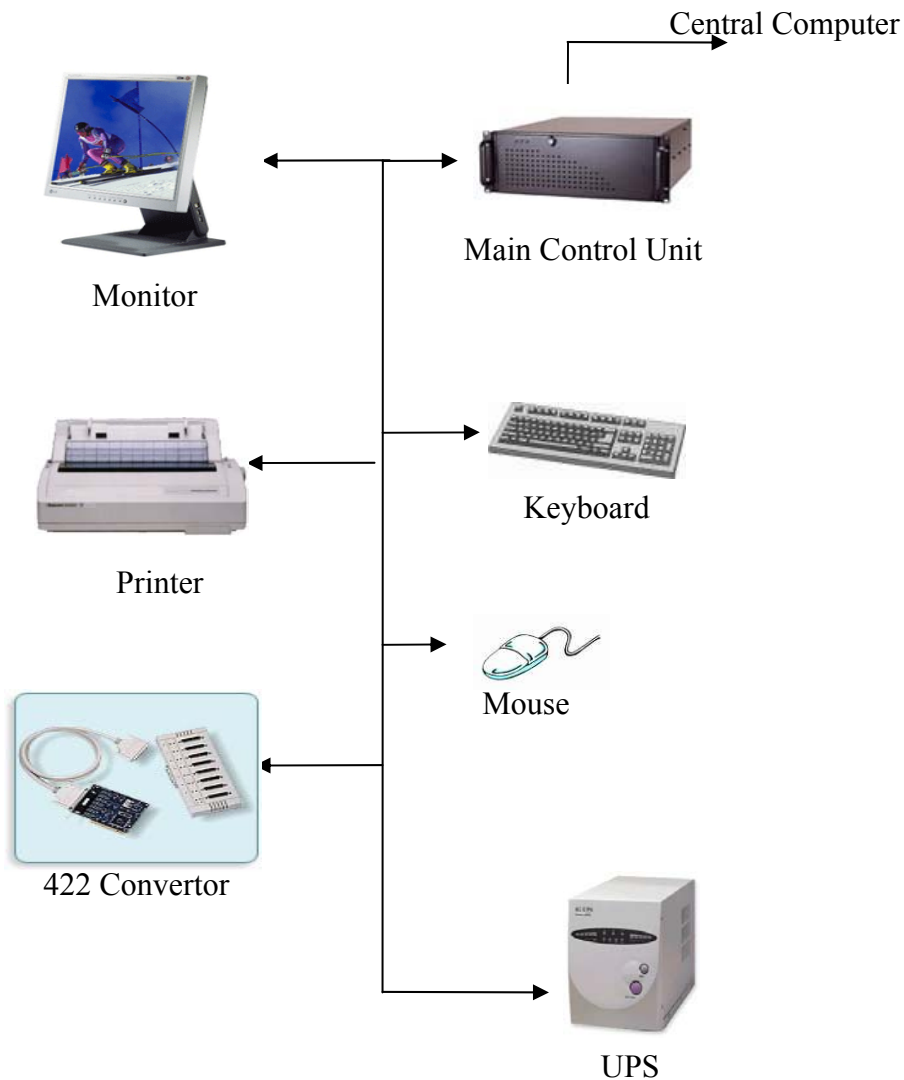
3.6.1 Brief introduction

The Station Supervisory System is installed in control office of each station. This system monitors and controls the AFC equipments in a station, and transmits accounting and various alarm data which are collected from local equipments, to the Central Computer. It transmits the initial data such as date, time and fare table to local equipments.

3.6.2 Function

- Monitoring and controlling of local equipment
- Collecting of various accounting and statistical data
- Transmission of the collected data to the Central Computer
- Transmission of operational data from the Central Computer to the local equipments
- Back-up operation in case of disconnection with Central Computer

3.6.3 Schematic Diagram



3.6.4 Communication of Station Supervisory System

(1) From Station Supervisory System to Central Computer

- Real Time Transmission
 - Fault condition of local equipment
 - Refilling the changes and withdrawals of coin/bill
 - Change of date, time and fare table, etc.
- Batch Transmission
 - Quantities of issued tickets and sales amount
 - Recharging information through Recharging Machine

(2) From Central Computer to Station Supervisory System

- Fare Table
- Blacklist of Security Algorithm
- Date and Time, etc

(3) From Station Supervisory System to local equipments

- Fare Table and Section Table
- Date and Time
- Station Number, etc

(4) From local equipments to Station Supervisory System

- Alarm
- Event
- Accounting and Statistics Data, etc

3.6.5 Reports of Station Supervisory System

(1) Station Supervisory System generates a real-time report, accounting and statistics reports. The data which are collected from local equipments is reported in real-time mode. Accounting and statistics report is generated with regular time.

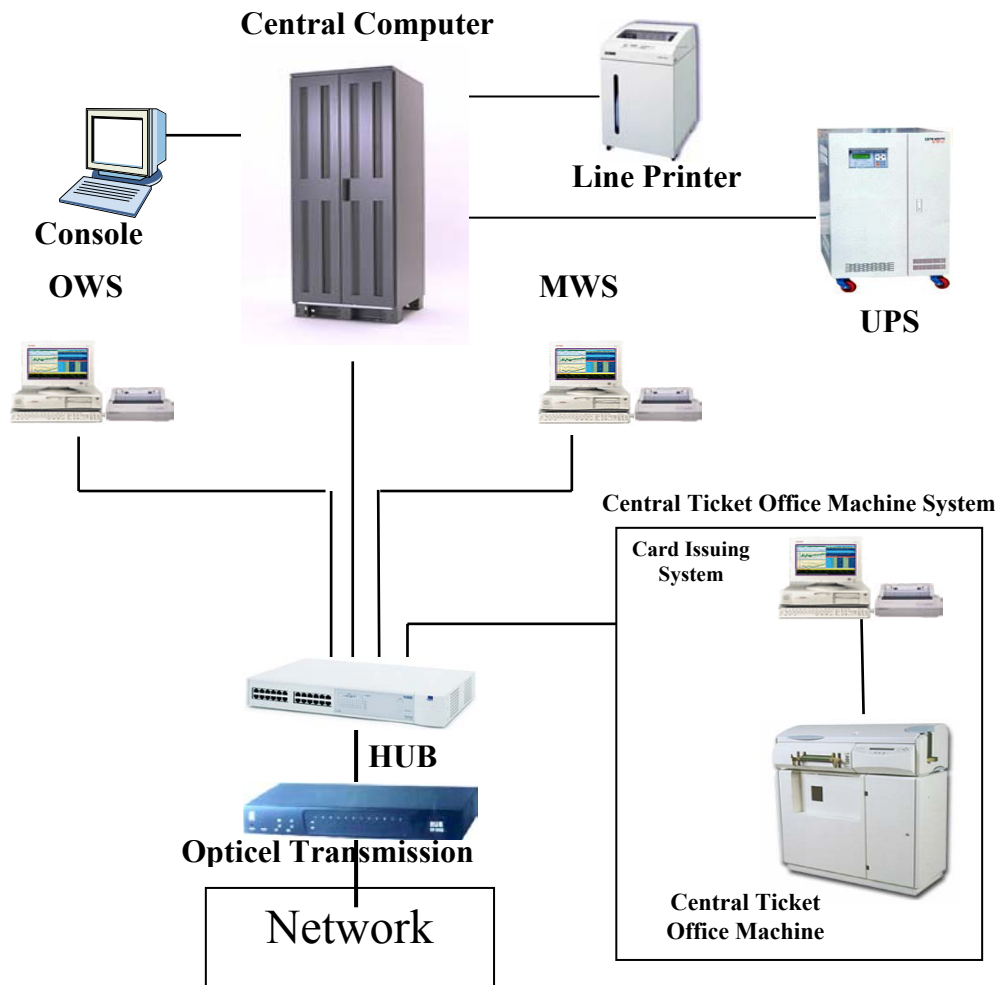
(2) Various reports are printed on specified date and time by an operator request.

3.7 Central Computer System

3.7.1 Function

- 1) Monitoring and controlling of the local equipments
- 2) Allocation and management of vehicle referring to transportation quantities
- 3) Generation of operational data and transmission of initial data to
- 4) local equipments
- 5) Database, account management and static management from the
- 6) data of local equipments
- 7) Report of various data
- 8) Transmission of various maintenance data (MWS)
- 9) Transmission of all accounting and statistics data upon request from Operator Work Station(OWS)
- 10) Management of transaction sheets and issuing registration of all tickets

3.7.2 Configuration



- System Console : Management of Central Computer
- Operator Work Station(OWS): Management and printing of various reports
- Maintenance Work Station (MWS): Management and printing of the maintenance data
- Central Issuing System : Initial data set-up of the ticket
- Uninterrupted Power Supply(UPS)

4 Conclusion

Ticketing System in Phase 2

Because the main goal of ticketing system in phase 2 is to achieve the technical verification of PRT System, it could be the optimum solution to configure the system that is related to PRT operation in test track.

Among the system and equipments which were explained previously, Station Supervisory System, Automatic Vending Machine, and Ticket Validation System could be installed in station and control office. Through more study and detail design of PRT, the optimized ticketing system could be configured for the main project.