

System Testing Plan for Public Transportation System

- Test Plan
- Test Design Specification
- Test Cases Specification

Project Team

Team1

Date

2014-12-12

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1 Introduction

1.1 Objectives

본 문서는 2014년 2학기 건국대학교 Software Engineering (2014SE) 수업에서 T1이 개발한 Public Transportation System (PTS)의 System Testing Plan (STP)을 위한 문서이다.

1.2 Background

PTS의 System Testing (ST)을 위하여 PTS의 Software Requirement Specification (SRS)에 대한 이해가 필요하다. SRS는 2014SE 수업홈페이지에 게재되어 있다.

System Testing은 통합된 각 모듈들이 원래 계획했던 대로 작동하는지, 시스템의 실제 동작과 원래 의도했던 요구사항과는 차이가 없는지 등을 판단하게 된다. 수행 시간, 파일 저장 및 처리 능력, 최대 부하, 복구 및 재시동 능력, 수작업 절차 등을 점검한다.

1.3 Scope

본 STP는 대중교통시스템 (PTS)을 이용하여 진행되어 지는 일련의 프로세스들에 대한 ST를 명세하고 있다.

1.4 Project plan

완성된 PTS의 Software(SW)를 ST하기위한 본 계획서를 작성한다.

본 계획서에 작성된 내용에 기반하여 ST를 수행한다.

ST에 대한 결과를 STR(System Testing Result) 리포트를 작성한다.

1.5 Configuration management plan

SASD를 이용하여 SW를 구현한 후, System Testing (ST)를 수행한다.

1.6 References

2014-SE PTS SRS Ver 1.0

2014-SE PTS SRA Ver 3.0

2 Test items

2.1 Software requirements specification

2.1.1 Product functions

(1) Terminal Tag

버스, 지하철 5개 각 역에서 태그를 할 경우 조건들을 따져서 승차, 하차 여부와 잔액을 비교하여 버스, 지하철에 탑승 여부를 결정한다.

(2) Settlement

하루가 지날 때 한번씩 정산이 이루어 진다.

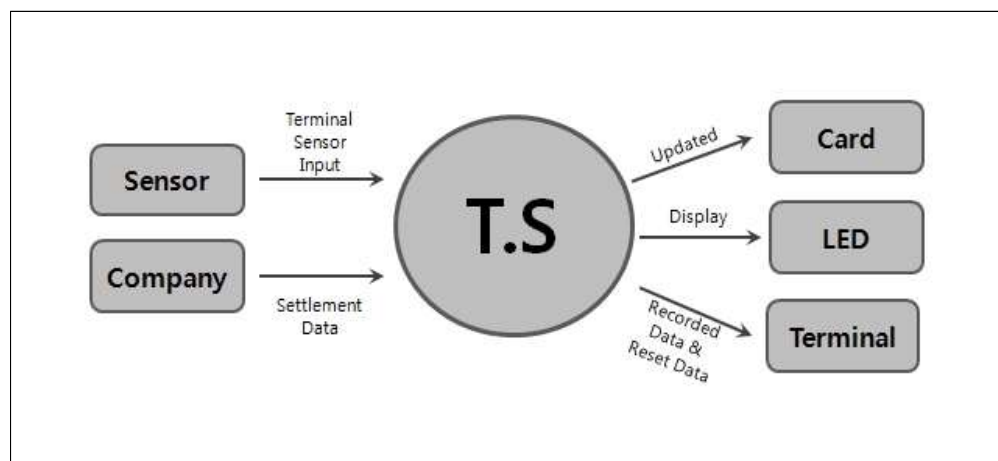
2.1.2 Constrains

- (1) 하루는 3분으로 가정한다.
- (2) 교통카드는 저장된 텍스트 파일로 가정하고, 교통카드 태그 행위를 해당 파일을 입력하는 것으로 가정한다.

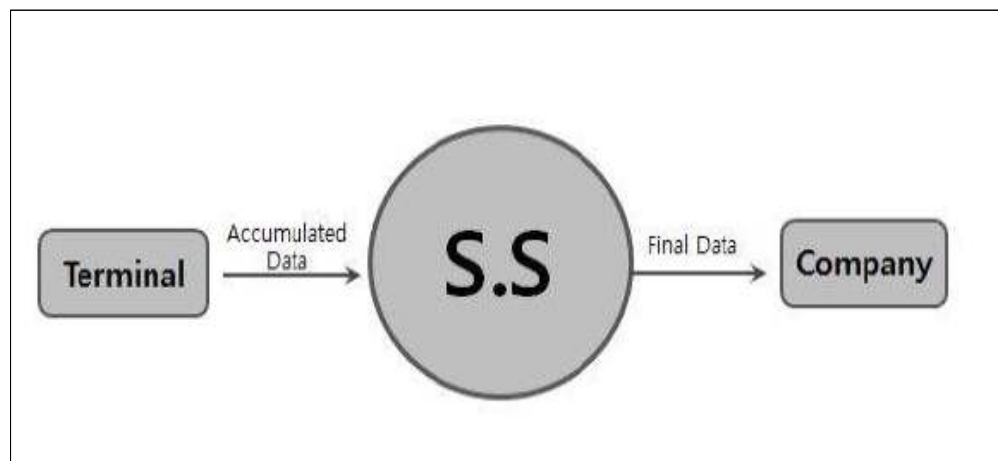
2.2 Software requirements analysis

2.2.1 Basic System Context Diagram

(1) Terminal System



(2) Settlement System



2.2.2 Event List

(1) Terminal System

| Input / Output Event | Description |
|-----------------------|---|
| Terminal Sensor Input | 단말기 센서에 태그 되었을 때 교통카드의 정보 |
| Updated | 단말기 시스템 안에서 계산된 결과를 가지고 갱신시킬 카드의 정보 |
| Display | 단말기 시스템 안에서 계산된 결과를 가지고 LED 화면에 출력할 정보 (Wait Mode / Correct Mode / Warning Mode) |
| Settlement Status | Company에서 보내준 정산 완료 여부 정보 |
| Recorded Data | 터미널에 누적계산기록에 기록될 결제 정보 |
| Reset Data | 터미널 누적계산기록을 초기화시킬 여부를 결정할 정보 |

(2) Settlement System

| Input / Output Event | Description |
|----------------------|--|
| Accumulated Data | 각각의 Terminal에서 누적된 data |
| Final Bus Data | Settlement System에서 정산된 Bus Company 지분 또는 Hold를 결정하는 데이터 |
| Final Metro Data | Settlement System에서 정산된 Metro Company 지분 또는 Hold를 결정하는 데이터 |

3 Approach

요구사항에 정의되어 있는 기능들을 확인하기 위한 시나리오를 작성한다. 작성한 시나리오에 기반하여 Testing design 및 Test cases를 작성하여 Testing을 수행한다.

4 Item pass/fail criteria

<Table 2 System Test Design Identification> 참조

5 System test design specification

5.1 Test design specification identifier

T1_PTS.STC.Number

5.2 Features to be tested

5.2.1 요금 테스트

(1) 기본요금

1) 버스, 각 지하철 역을 태그시 1050원에 기본요금이 부과된다.

(2) 1회 환승 후 하차 요금

1) 버스(승차), 버스(하차), 지하철(승차) 후 지하철을 하차할 때 1개 역이 차이가 날 경우 300원이 부과되고 2개역이 차이가 날 때는 600원이 부과된다.

2) 지하철(승차), 지하철(하차), 버스(승차) 후 버스를 하차할 때 승차와 하차사이의 시간이 30초가 지날 때마다 100원이 추과로 부과된다.

(3) 미정산 요금

1) 지하철에서 버스 환승 후 하차 시 단말기를 태그 하지 않는 경우 지하철에 승차 시 1750원의 요금이 부과된다.

2) 버스에서 지하철 환승 후 하차 시 단말기를 태그 하지 않는 경우 버스에 승차 시 1650원의 요금이 부과된다.

3) 지하철 기본요금 부과 후 하차 시 단말기를 태그 하지 않는 경우 지하철, 버스 승차 시 1250원의 요금이 부과된다.

4) 버스 기본요금 부과 후 하차 시 단말기를 태그 하지 않는 경우 지하철, 버스 승차 시 1050원의 기본요금이 부과된다.

5) 전날 지하철 환승 탑승 후 하차 미태그 후 다음날 지하철 또는 버스를 탑승 시 1650원의 요금이 부과된다.

6) 전날 버스 환승 탑승 후 하차 미태그 후 다음날 지하철 또는 버스를 탑승 시 1750원의 요금이 부과된다.

7) 전날 지하철 기본요금 탑승 후 하차 미태그 후 다음날 지하철 또는 버스를 탑승 시 1250원의 요금이 부과된다.

8) 전날 버스 기본요금 탑승 후 하차 미태그 후 다음날 지하철 또는 버스를 탑승 시 1050원의 요금이 부과된다.

5.2.2 환승 가능한 시간 테스트

(1) 버스에서 지하철로 환승할 때 15초 이내로 태그해야 환승이 가능하다.

(2) 지하철에서 버스로 환승할 때 15초 이내로 태그해야 환승이 가능하다.

5.2.3 잔액 부족 테스트

(1) 잔액이 모자를 경우 태우지 않는다.

(2) 버스 환승 최고 부과금액인 700원이 남아 있지 않으면 버스로 환승시키지 않는다.

(3) 지하철 환승 최고 부과금액인 600원이 남아 있지 않으면 지하철로 환승시키지 않는다.

5.2.4 정산시스템 테스트

5.2.5 기타 요구사항 만족 테스트

5.3 Approach refinements

PTS는 SRS의 Specific Requirements에 나온 모든 동작을 명세 된 내용과 동일하게 수행해야 한다. 각 시나리오들이 정해진 순서의 입력을 받았을 때, SRS에 명세 된 동작을 수행해야 한다.

5.4 Test identification

T1_PTS.STC.Number.Number

5.5 Feature pass/fail criteria

6 System test case specification

<Table 2 System Test Design Identification>참조

<Table 3 Test Cases Identification>참조

6.1 Test case specification identifier

6.2 Test items

6.3 Input specifications

6.4 Output specifications

7 Testing tasks

<Table 1 Testing Tasks & Schedule>

| Task | Predecessor tasks | Special skills | Effort | Finish date |
|--------------------------------|---|----------------|--------|-------------|
| (1) STP 작성 | T1.PTS.2014.SRS, T1.PTS,2014,SRA T1.PTS 구현 완료 | | 5 | |
| (2) Test case specification 작성 | | PTS에 대한 지식 | 2 | |
| (3) ST를 위한 인력 배치 | | | 1 | |
| (4) ST를 위한 환경 구축 | | | 1 | |
| (5) ST 수행 | | | 3 | |
| (6) ST report 작성 | | | 2 | |

8 Environmental needs

PTS를 실행하기 위한 PC – Cygwin 필요

9 System test deliverables

10 Schedules

<Table 1 Testing Tasks & Schedule> 참조

<Table 2 System Test Design Identification>

| Identifier | Feature | Valid / Invalid value |
|----------------|---------------|--|
| T1.PTS.STC.000 | 요금 테스트 | 기본요금, 환승 후 요금, 미정산 요금 등 태그 했을 시 나올 수 있는 모든 요금을 계산한다. 계산한 값과 txt파일에 저장된 값 두 개가 정확한지 확인한다. |
| T1.PTS.STC.001 | 환승 가능한 시간 테스트 | 탑승 하차 후 환승 가능한 시간을 확인한다. |
| T1.PTS.STC.002 | 잔액 부족 테스트 | 요금이 부족 했을 때 버스, 지하철을 태우는지 확인한다. 버스, 지하철에 태우지 않았을 때 txt파일에 저장되지 않는지 확인한다. |
| T1.PTS.STC.003 | 정산 시스템 테스트 | 하루(180초)동안 태그를 한 후 하루가 지났을 때 정산이 제대로 완료 됐는지 확인한다. |
| T1.PTS.STC.004 | 정산 완료 신호 테스트 | 정산 프로그램이 제대로 작동하면 정산 완료 후 터미널 시스템이 정상적으로 계속 작동하고 정산 시스템이 제대로 작동 안하거나 정지해 있으면 다음날 터미널 시스템이 정상 작동하면 안되는지 확인한다. |
| T1.PTS.STC.005 | 정산 시스템 주기 테스트 | 하루 주기로 작동하는지 확인한다. |
| T1.PTS.STC.006 | 텍스트 파일 | SRS 요구조건에 맞게 텍스트 파일이 저장되 있는지 확인한다. |

<Table 3 Test Cases Identification>

| Test case identifier | Input specification | Output specification |
|----------------------|--|---|
| T1.PTS.STC.000.000 | (CardData) M,999050,1_3 (TerminalData) B,1,1050,0_3 | (Terminal.txt) YYYYMMDDHHMM,B,1,988900,0_8 (Card.txt)YYYYMMDDHHMM,B,0,988900,0_9 |
| T1.PTS.STC.000.001 | (CardData)B,0,988900,0_9 (TerminalData) B,0,0,0_9 | (Terminal.txt) YYYYMMDDHHMM,M,1,1050,1_7 (Card.txt) YYYYMMDDHHMM,M,1,987850,1_7 |
| T1.PTS.STC.000.002 | (CardData) 201503060008,M,1,736400,1_1 201503060016,M,0,736200,3_1 201503060032,B,1,736200,0_1 (TerminalData) 201503060008,M,1,1050,1_1 201503060016,M,0,200,3_1 201503060032,B,1,0,0_1 | (Terminal) 현재요금 : 1050, 잔액 : 98950 (Terminal.txt) 201412010808,B,1,988900,0_8 (Card.txt)201412010808,B,0,988900,0_9 |
| T1.PTS.STC.000.003 | (CardData) 201503070056,M,1,733050,1_3 201503070104,M,0,733050,1_4 201503070120,B,1,733050,0_2 (TerminalData) 201503070056,M,1,1050,1_3 | (Terminal.txt)201503070616,B,0,100,0_3 (Card.txt)201503070616,B,0,732950,0_3 |

| | | |
|--------------------|--|---|
| | 201503070104,M,0,0,1_4 201503070120,B,1,0,0_2 | |
| T1.PTS.STC.000.004 | (CardData) 201503071304,M,1,731900,1_5 201503071312,M,0,731900,1_6 201503071320,B,1,731900,0_4 (TerminalData) 201503071304,M,1,1050,1_5 201503071312,M,0,0,1_6 201503071320,B,1,0,0_4 | (Terminal.txt)201503072248,B,0,200,0_5 (Card.txt)201503072248,B,0,731700,0_5 |
| T1.PTS.STC.000.005 | (CardData) 201503090952,M,1,729300,1_1 201503091008,M,0,729300,1_2 201503091008,B,1,729300,0_1 (TerminalData) 201503090952,M,1,1050,1_1 201503091008,M,0,0,1_2 201503091008,B,1,0,0_1 | (Terminal.txt) 201503092024,B,0,200,0_2 (Card.txt) 201503092024,B,0,729100,0_2 |
| T1.PTS.STC.000.006 | (CardData) 201503081032,M,1,1050,1_1 201503081048,M,0,0,1_2 201503081056,B,1,0,0_1 | (Terminal.txt)201503082320,B,0,300,0_2 (Card.txt)201503082320,B,0,730350,0_2 |

| | | |
|--------------------|--|---|
| | (TerminalData) 201503081032,M,1,730650,1_1 201503081048,M,0,730650,1_2 201503081056,B,1,730650,0_1 | |
| T1.PTS.STC.000.007 | (CardData) 201504060004,M,1,550750,1_5 201504060004,M,0,550750,1_6 201504060008,B,1,550750,0_2 (TerminalData) 201504060004,M,1,1050,1_5 201504060004,M,0,0,1_6 201504060008,B,1,0,0_2 | (Terminal.txt) 201504062344,B,0,500,0_3 (Card.txt) 201504062344,B,0,550250,0_3 |
| T1.PTS.STC.000.008 | (CardData) 201504170016,M,1,97200,1_3 201504170016,M,0,97200,1_4 201504170016,B,1,97200,0_1 (TerminalData) 201504170016,M,1,1050,1_3 201504170016,M,0,0,1_4 201504170016,B,1,0,0_1 | (Termina.txtl) 201504180024,B,1,1750,0_1 (Card.txt) 201504180024,B,1,95450,0_1 |
| T1.PTS.STC.000.009 | (CardData) | (Terminal.txt) |

| | | |
|--------------------|---|---|
| | 201504180032,M,0,95450,1_2 201504180032,M,1,94400,1_3 201504180032,M,0,94400,1_4 (TerminalData) 201504180032,M,1,1050,1_3 201504180032,M,0,0,1_4 201504180032,B,1,0,0_3 | 201504190456,B,1,1750,0_1 (Card.txt) 201504180032,B,1,94400,0_3 |
| T1.PTS.STC.000.010 | (CardData) B,1,715050,0_5 B,0,715050,0_6 M,1,715050,5_1) (TerminalData) B,1,1050,0_5 B,0,0,0_6 M,1,0,5_1 | (Card.txt) YYYYMMDDHHMM,M,0,715050,5_2 (Termianl.txt) YYYYMMDDHHMM,M,0,0,5_2 |
| T1.PTS.STC.000.011 | (CardData) B,1,712950,0_11 B,0,712950,0_12 M,1,712950,5_3 (TerminalData) B,1,1050,0_11 | (Card.txt) YYYYMMDDHHMM,M,0,712650,4_1 (Termianl.txt) YYYYMMDDHHMM,M,0,300,4_1 |

| | | |
|--------------------|--|---|
| | B,0,0,0_12 M,1,0,5_3 | |
| T1.PTS.STC.000.012 | (CardData) B,1,711600,0_1 B,0,711600,0_2 M,1,711600,5_1 (TerminalData) B,1,1050,0_1 B,0,0,0_2 M,1,0,5_1 | (Card.txt) YYYYMMDDHHMM,M,0,711000,3_1 (Terminal.txt) YYYYMMDDHHMM,M,0,600,3_1 |
| T1.PTS.STC.000.013 | (CardData) B,1,709950,0_3 B,0,709950,0_4 M,1,709950,5_2 (TerminalData) B,1,1050,0_3 B,0,0,0_4 M,1,0,5_2 | (Card.txt) YYYYMMDDHHMM,M,0,709350,2_1 (Terminal.txt) YYYYMMDDHHMM,M,0,600,2_1 |
| T1.PTS.STC.000.014 | (CardData) B,1,704550,0_13 B,0,704550,0_14 | (Card.txt) YYYYMMDDHHMM,M,0,704250,1_1 (Terminal.txt) |

| | | |
|--------------------|--|---|
| | M,1,704550,5_4 (TerminalData) B,1,1050,0_13 B,0,0,0_14 M,1,0,5_4 | YYYYMMDDHHMM,M,0,300,1_1 |
| T1.PTS.STC.000.015 | (CardData) B,1,701850,0_5 B,0,701850,0_6 M,1,701850,4_1 (TerminalData) B,1,1050,0_5 B,0,0,0_6 M,1,0,4_1 | (Card.txt) YYYYMMDDHHMM,M,0,701550,5_2 (Terminal.txt) YYYYMMDDHHMM,M,0,300,5_2 |
| T1.PTS.STC.000.016 | (CardData) B,1,700500,0_7 B,0,700500,0_8 M,1,700500,4_2 (TerminalData) B,1,1050,0_7 B,0,0,0_8 M,1,0,4_2 | (Card.txt) YYYYMMDDHHMM,M,0,700500,4_3 (Terminal.txt) YYYYMMDDHHMM,M,0,0,4_3 |

| | | |
|---------------------------|---|--|
| <p>T1.PTS.STC.000.017</p> | <p>(CardData) B,1,699450,0_9 B,0,699450,0_10 M,1,699450,4_4 (TerminalData) B,1,1050,0_9 B,0,0,0_10 M,1,0,4_4</p> | <p>(Card.txt) YYYYMMDDHHMM,M,0,699150,3_1 (Terminal.txt) YYYYMMDDHHMM,M,0,300,3_1</p> |
| <p>T1.PTS.STC.000.018</p> | <p>(CardData) B,1,698100,0_11 B,0,698100,0_12 M,1,698100,4_5 (TerminalData) B,1,1050,0_11 B,0,0,0_12 M,1,0,4_5</p> | <p>(Card.txt) YYYYMMDDHHMM,M,0,697500,2_1 (Termianl.txt) YYYYMMDDHHMM,M,0,600,2_1</p> |
| <p>T1.PTS.STC.000.019</p> | <p>(CardData) B,1,696450,0_1 B,0,696450,0_2 M,1,696450,4_1 (TerminalData)</p> | <p>(Card) YYYYMMDDHHMM,M,0,695850,1_1 (Terminal) YYYYMMDDHHMM,M,0,600,1_1</p> |

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| | B,1,1050,0_1 B,0,0,0_2 M,1,0,4_1 | |
| T1.PTS.STC.000.020 | (CardData) B,1,694800,0_3 B,0,694800,0_4 M,1,694800,3_1 (TerminalData) B,1,1050,0_3 B,0,0,0_4 M,1,0,3_1 | (Card) YYYYMMDDHHMM,M,0,694200,5_1 (Terminal) YYYYMMDDHHMM,M,0,600,5_1 |
| T1.PTS.STC.000.021 | (CardData) B,1,691800,0_5 B,0,691800,0_6 M,1,691800,3_2 (TerminalData) B,1,1050,0_5 B,0,0,0_6 M,1,0,3_2 | (Card) YYYYMMDDHHMM,M,0,691500,4_1 (Terminal) YYYYMMDDHHMM,M,0,300,4_1 |
| T1.PTS.STC.000.022 | (CardData) B,1,690450,0_7 | (Card) YYYYMMDDHHMM,M,0,690450,3_4 |

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| | <p>B,0,690450,0_8 M,1,690450,3_3 (TerminalData) B,1,1050,0_7 B,0,0,0_8 M,1,0,3_3</p> | <p>(Terminal) YYYYMMDDHHMM,M,0,0,3_4</p> |
| <p>T1.PTS.STC.000.023</p> | <p>(CardData) B,1,689400,0_9 B,0,689400,0_10 M,1,689400,3_5 (TerminalData) B,1,1050,0_9 B,0,0,0_10 M,1,0,3_5</p> | <p>(Card) YYYYMMDDHHMM,M,0,689100,2_2 (Terminal) YYYYMMDDHHMM,M,0,300,2_2</p> |
| <p>T1.PTS.STC.000.024</p> | <p>(CardData) B,1,688050,0_11 B,0,688050,0_12 M,1,688050,3_6 (TerminalData) B,1,1050,0_11 B,0,0,0_12 M,1,0,3_6</p> | <p>(Card) YYYYMMDDHHMM,M,0,687450,1_1 (Terminal) YYYYMMDDHHMM,M,0,600,1_1</p> |

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| <p>T1.PTS.STC.000.025</p> | <p>(CardData) B,1,684300,0_3 B,0,684300,0_4 M,1,684300,2_2 (TerminalData) B,1,1050,0_3 B,0,0,0_4 M,1,0,2_2</p> | <p>(Card) YYYYMMDDHHMM,M,0,683700,5_1 (Terminal) YYYYMMDDHHMM,M,0,600,5_1</p> |
| <p>T1.PTS.STC.000.026</p> | <p>(CardData) B,1,682650,0_5 B,0,682650,0_6 M,1,682650,2_3 (TerminalData) B,1,1050,0_5 B,0,0,0_6 M,1,0,2_3</p> | <p>(Card) YYYYMMDDHHMM,M,0,682050,4_1 (Terminal) YYYYMMDDHHMM,M,0,600,4_1</p> |
| <p>T1.PTS.STC.000.027</p> | <p>(CardData) B,1,681000,0_7 B,0,681000,0_8 M,1,681000,2_4 (TerminalData)</p> | <p>(Card) YYYYMMDDHHMM,M,0,680700,3_1 (Terminal) YYYYMMDDHHMM,M,0,300,3_1</p> |

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| | B,1,1050,0_7 B,0,0,0_8 M,1,0,2_4 | |
| T1.PTS.STC.000.028 | (CardData) B,1,677350,0_3 B,0,677350,0_4 M,1,677350,2_1 (TermianlData) B,1,1050,0_3 B,0,0,0_4 M,1,0,2_1 | (Card) YYYYMMDDHHMM,M,0,677350,2_2 (Terminal) YYYYMMDDHHMM,M,0,0,2_2 |
| T1.PTS.STC.000.029 | (CardData) B,1,676300,0_5 B,0,676300,0_6 M,1,676300,2_3 (TermianlData) B,1,1050,0_5 B,0,0,0_6 M,1,0,2_3 | (Card) YYYYMMDDHHMM,M,0,676000,1_2 (Terminal) YYYYMMDDHHMM,M,0,300,1_2 |
| T1.PTS.STC.000.030 | (CardData) B,1,674950,0_7 | (Card) YYYYMMDDHHMM,M,0,674650,5_1 |

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| | B,0,674950,0_8 M,1,674950,1_3 (TermianIData) B,1,1050,0_7 B,0,0,0_8 M,1,0,1_3 | (Terminal) YYYYMMDDHHMM,M,0,300,5_1 |
| T1.PTS.STC.000.031 | (CardData) B,1,673600,0_1 B,0,673600,0_2 M,1,673600,1_1 (TermianIData) B,1,1050,0_1 B,0,0,0_2 M,1,0,1_1 | (Card) YYYYMMDDHHMM,M,0,673000,4_1 (Terminal) YYYYMMDDHHMM,M,0,600,4_1 |
| T1.PTS.STC.000.032 | (CardData) B,1,671950,0_3 B,0,671950,0_4 M,1,671950,1_2 (TermianIData) B,1,1050,0_3 B,0,0,0_4 | (Card) YYYYMMDDHHMM,M,0,671350,3_1 (Terminal) YYYYMMDDHHMM,M,0,600,3_1 |

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| | M,1,0,1_2 | |
| T1.PTS.STC.000.033 | (CardData) B,1,670300,0_5 B,0,670300,0_6 M,1,670300,1_3 (TermianIData) B,1,1050,0_5 B,0,0,0_6 M,1,0,1_3 | (Card) YYYYMMDDHHMM,M,0,669700,3_2 (Terminal) YYYYMMDDHHMM,M,0,600,3_2 |
| T1.PTS.STC.000.034 | (CardData) B,1,664100,0_9 B,0,664100,0_10 M,1,664100,1_6 (TermianIData) B,1,1050,0_9 B,0,0,0_10 M,1,0,1_6 | (Card) YYYYMMDDHHMM,M,0,664100,1_7 (Terminal) YYYYMMDDHHMM,M,0,0,1_7 |
| T1.PTS.STC.000.035 | (CardData) M,1,657950,1_15 M,0,657950,1_16 B,1,657950,0_14 | (Card) YYYYMMDDHHMM,M,1,656200,1_17 (Terminal) YYYYMMDDHHMM,M,1,1750,1_17 |

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| | (TermianIData) M,1,1050,1_15 M,0,0,1_16 B,1,0,0_14 | |
| T1.PTS.STC.000.036 | (CardData) B,1,653900,0_17 B,0,653900,0_18 M,1,653900,1_18 (TermianIData) B,1,1050,0_17 B,0,0,0_18 M,1,0,1_18 | (Card) YYYYMMDDHHMM,B,1,652250,0_19 (Terminal) YYYYMMDDHHMM,B,1,1650,0_19 |
| T1.PTS.STC.000.037 | (CardData) M,1,650150,1_21 (TermianIData) M,1,1050,1_21 | (Card) YYYYMMDDHHMM,B,1,648900,0_20 (Terminal) YYYYMMDDHHMM,B,1,1250,0_20 |
| T1.PTS.STC.000.038 | (CardData) M,1,637050,1_3 M,0,637050,1_4 M,1,636000,1_5 (TermianIData) | (Card) YYYYMMDDHHMM,M,0,637050,1_4 (Terminal) YYYYMMDDHHMM,B,1,1250,0_1 |

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| | M,1,1050,1_3 M,0,0,1_4 M,1,1050,1_5 | |
| T1.PTS.STC.000.039 | (CardData) B,1,625600,0_3 (TermianlData) B,1,1050,0_3 | (Card) YYYYMMDDHHMM,M,1,624550,1_1 (Terminal) YYYYMMDDHHMM,M,1,1050,1_1 |
| T1.PTS.STC.000.040 | (CardData) B,1,621850,0_6 B,0,621850,0_7 B,1,620800,0_8 (TermianlData) B,1,1050,0_6 B,0,0,0_7 B,1,1050,0_8 | (Card) YYYYMMDDHHMM,M,1,619750,1_2 (Terminal) YYYYMMDDHHMM,M,1,1050,1_2 |
| T1.PTS.STC.000.041 | (CardData) M,1,618700,1_4 (TermianlData) M,1,1050,1_4 | (Card) YYYYMMDDHHMM,M,1,617050,1_1 (Terminal) YYYYMMDDHHMM,M,1,1650,1_1 |
| T1.PTS.STC.000.042 | (CardData) | (Card) |

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| | M,1,616000,1_3 (TermianIData) M,1,1050,1_3 | YYYYMMDDHHMM,B,1,614350,0_1 (Terminal) YYYYMMDDHHMM,B,1,1650,0_1 |
| T1.PTS.STC.000.043 | (CardData) B,1,613300,0_3 (TermianIData) B,1,1050,0_3 | (Card) YYYYMMDDHHMM,M,1,611550,1_1 (Terminal) YYYYMMDDHHMM,M,1,1750,1_1 |
| T1.PTS.STC.000.044 | (CardData) B,1,608850,0_3 (TermianIData) B,1,1050,0_3 | (Card) YYYYMMDDHHMM,B,1,607100,0_1 (Terminal) YYYYMMDDHHMM,B,1,1750,0_1 |
| T1.PTS.STC.001.001 | (CardData) 201503271656,B,1,603350,0_7 201503271712,B,0,603350,0_8 (TermianIData) 201503271656,B,1,1050,0_7 201503271712,B,0,0,0_8 | (Card) 201503271720,M,1,603350,1_2 (Terminal) 201503271720,M,1,0,1_2 |
| T1.PTS.STC.001.002 | (CardData) 201503280032,B,1,600650,0_1 201503280032,B,0,600650,0_2 | (Card) 201503280136,M,1,600650,1_1 (Terminal) |

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| | (TermianIData) 201503280032,B,1,1050,0_1 201503280032,B,0,0,0_2 | 201503280136,M,1,0,1_1 |
| T1.PTS.STC.001.003 | (CardData) 201503281056,B,1,593550,0_11 201503281120,B,0,593550,0_12 (TermianIData) 201503281056,B,1,1050,0_11 201503281120,B,0,0,0_12 | (Card) 201503281320,M,1,593550,1_3 (Terminal) 201503281320,M,1,0,1_3 |
| T1.PTS.STC.001.004 | (CardData) 201503281920,B,1,588150,0_19 201503281920,B,0,588150,0_20 (TermianIData) 201503281920,B,1,1050,0_19 201503281920,B,0,0,0_20 | (Card) 201503282128,M,1,587100,1_5 (Terminal) 201503282128,M,1,1050,1_5 |
| T1.PTS.STC.001.005 | (CardData) 201503290336,M,0,581600,1_8 201503290336,M,1,580550,1_9 201503290344,B,1,579300,0_2 201503290352,B,0,579300,0_3 (TermianIData) | (Card) 201503290408,M,1,579300,1_10 (Terminal) 201503290408,M,1,0,1_10 |

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| | 201503290336,M,0,0,1_8 201503290336,M,1,1050,1_9 201503290344,B,1,1250,0_2 201503290352,B,0,0,0_3 | |
| T1.PTS.STC.001.006 | (CardData) 201503291032,M,1,575100,1_16 201503291032,M,0,575100,1_17 201503291040,B,1,575100,0_7 201503291040,B,0,575100,0_8 (TermianlData) 201503291032,M,1,1050,1_16 201503291032,M,0,0,1_17 201503291040,B,1,0,0_7 201503291040,B,0,0,0_8 | (Card) 201503291152,M,1,575100,1_18 (Terminal) 201503291152,M,1,0,1_18 |
| T1.PTS.STC.001.007 | (CardData) 201503291632,M,1,574050,1_20 201503291632,M,0,574050,1_21 201503291640,B,1,574050,0_9 201503291648,B,0,574050,0_10 (TermianlData) 201503291632,M,1,1050,1_20 | (Card) 201503291848,M,1,574050,1_22 (Terminal) 201503291848,M,1,0,1_22 |

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| | 201503291632,M,0,0,1_21 201503291640,B,1,0,0_9 201503291648,B,0,0,0_10 | |
| T1.PTS.STC.001.008 | (CardData) 201503300008,M,1,571950,1_1 201503300024,M,0,571950,1_2 201503300024,B,1,571950,0_1 201503300032,B,0,571950,0_2 (TermianlData) 201503300008,M,1,1050,1_1 201503300024,M,0,0,1_2 201503300024,B,1,0,0_1 201503300032,B,0,0,0_2 | (Card) 201503300240,M,1,570900,1_3 (Terminal) 201503300240,M,1,1050,1_3 |
| T1.PTS.STC.001.009 | (CardData) 201503300616,M,1,569850,1_5 201503300632,M,0,569850,1_6 (TermianlData) 201503300616,M,1,1050,1_5 201503300632,M,0,0,1_6 | (Card) 201503300640,B,1,569850,0_3 (Terminal) 201503300640,B,1,0,0_3 |
| T1.PTS.STC.001.010 | (CardData) 201503301544,M,1,567050,1_9 | (Card) 201503301704,B,1,567050,0_4 |

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| | 201503301552,M,0,567050,1_10 (TermianIData) 201503301544,M,1,1050,1_9 201503301552,M,0,0,1_10 | (Terminal) 201503301704,B,1,0,0_4 |
| T1.PTS.STC.001.011 | (CardData) 201503302136,M,1,564250,1_13 201503302152,M,0,564250,1_14 (TermianIData) 201503302136,M,1,1050,1_13 201503302152,M,0,0,1_14 | (Card) 201503302352,B,1,564250,0_5 (Terminal) 201503302352,B,0,0,0_6 |
| T1.PTS.STC.001.012 | (CardData) 201504010400,B,1,563200,0_1 201504010408,B,0,563200,0_2 201504010416,M,1,563200,1_1 201504010432,M,0,563200,1_2 (TermianIData) 201504010400,B,1,1050,0_1 201504010408,B,0,0,0_2 201504010416,M,1,0,1_1 201504010432,M,0,0,1_2 | (Card) 201504010440,B,1,563200,0_3 (Terminal) 201504010440,B,1,0,0_3 |
| T1.PTS.STC.001.013 | (CardData) | (Card) |

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| | 201504071344,M,1,546900,1_6 201504071408,M,0,546900,1_7 (TermianlData) 201504071344,M,1,0,1_6 201504071408,M,0,0,1_7 | 201504071608,B,1,546900,0_5 (Terminal) 201504071608,B,1,0,0_5 |
| T1.PTS.STC.001.014 | (CardData) 201504080608,M,1,544100,1_3 201504080616,M,0,544100,1_4 (TermianlData) 201504080608,M,1,1050,1_3 201504080616,M,0,0,1_4 | (Card) 201504080824,B,1,543050,0_1 (Terminal) 201504080824,B,1,1050,0_1 |
| T1.PTS.STC.001.015 | (CardData) 201504080824,B,1,543050,0_1 201504081224,B,0,543050,0_2 201504081232,M,1,543050,1_5 201504081400,M,0,543050,1_6 (TermianlData) 201504080824,B,1,1050,0_1 201504081224,B,0,0,0_2 201504081232,M,1,0,1_5 201504081400,M,0,0,1_6 | (Card) 201504081400,B,1,543050,0_3 (Terminal) 201504081400,B,1,0,0_3 |

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| <p>T1.PTS.STC.001.016</p> | <p>(CardData) 201504081744,B,1,542000,0_5 201504081752,B,0,542000,0_6 201504081800,M,1,542000,1_7 201504081808,M,0,542000,1_8 (TermianlData) 201504081224,B,0,0,0_2 201504081232,M,1,0,1_5 201504081400,M,0,0,1_6 201504081400,B,1,0,0_3</p> | <p>(Card) 201504082008,B,1,542000,0_7 (Terminal) 201504081736,B,0,0,0_4</p> |
| <p>T1.PTS.STC.001.017</p> | <p>(CardData) 201504090024,B,1,539200,0_3 201504090032,B,0,539200,0_4 201504090040,M,1,539200,1_1 201504090048,M,0,539200,1_2 (TermianlData) 201504090024,B,1,1050,0_3 201504090032,B,0,0,0_4 201504090040,M,1,0,1_1 201504090048,M,0,0,1_2</p> | <p>(Card) 201504090408,B,1,538150,0_5 (Terminal) 201504090408,B,1,1050,0_5</p> |
| <p>T1.PTS.STC.002.001</p> | <p>(CardData)</p> | <p>(Card)</p> |

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| | 201504092056,B,0,500,0_6 (TermianIData) 201504092056,B,0,0,0_6 | 201504092056,B,0,500,0_6 (Terminal) 201504092056,B,0,0,0_6 |
| T1.PTS.STC.002.002 | (CardData) 201504110104,B,1,1450,0_1 201504110120,B,0,1450,0_2 201504110136,M,1,1450,1_1 (TermianIData) 201504110104,B,1,1050,0_1 201504110120,B,0,0,0_2 201504110136,M,1,0,1_1 | (Card) 201504110136,M,1,1450,1_1 (Terminal) 201504110136,M,1,0,1_1 |
| T1.PTS.STC.002.003 | (CardData) 201504111656,M,0,1500,1_2 201504111856,M,1,450,1_3 201504111912,M,0,450,1_4 (TermianIData) 201504111656,M,0,0,1_2 201504111856,M,1,1050,1_3 201504111912,M,0,0,1_4 | (Card) 201504111920,B,1,450,0_3 (Terminal) 201504111920,B,1,0,0_3 |
| T1.PTS.STC.002.004 | (CardData) 201504120216,B,1,2450,0_1 | (Card) 201504120240,B,1,800,0_3 |

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| | 201504120216,B,0,2450,0_2 201504120232,M,1,2450,1_1 (TermianIData) 201504120216,B,1,1050,0_1 201504120216,B,0,0,0_2 201504120232,M,1,0,1_1 | (Terminal) 201504120240,B,1,1650,0_3 |
| T1.PTS.STC.002.005 | (CardData) 201504121224,B,0,500,0_4 (TermianIData) 201504121224,B,0,0,0_4 | (Card) 201504121224,B,0,500,0_4 (Terminal) 201504121224,B,0,0,0_4 |
| T1.PTS.STC.002.006 | (CardData) 201504130256,B,1,450,0_1 201504130320,B,0,450,0_2 (TermianIData) 201504130256,B,1,1050,0_1 201504130320,B,0,0,0_2 | (Card) 201504130408,M,1,450,1_1 (Terminal) 201504130408,M,1,0,1_1 |
| T1.PTS.STC.002.007 | (CardData) 201504131944,M,1,1450,1_3 201504131952,M,0,1450,1_4 201504132000,B,1,1450,0_3 (TermianIData) | (Card) 201504132000,B,1,1450,0_3 (Terminal) 201504132000,B,1,0,0_3 |

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| | 201504131944,M,1,1050,1_3 201504131952,M,0,0,1_4 201504132000,B,1,0,0_3 | |
| T1.PTS.STC.002.008 | (CardData) 201504140944,M,0,3500,1_2 201504141048,M,1,2450,1_3 201504141104,M,0,2450,1_4 201504141104,B,1,2450,0_1 (TermianlData) 201504140944,M,0,0,1_2 201504141048,M,1,1050,1_3 201504141104,M,0,0,1_4 201504141104,B,1,0,0_1 | (Card) 201504141112,M,1,700,1_5 (Terminal) 201504141112,M,1,1750,1_5 |
| T1.PTS.STC.003.000 | Input=Terminal_Data{ M,1,1050 M,0,0 M,1,1050 M,0,200 M,1,1050 M,0,0 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{0, ,B} Settled_Metro_Fee.txt{5650,201412191144,M} |
| T1.PTS.STC.003.001 | Input= Terminal_Data{ M,1,1050 M,0,0 | Output=Settled_Bus_Fee.txt{3150,201412212032,B} Settled_Metro_Fee.txt{3350,201412211024,M} |

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| | M,1,1050 M,0,0 M,1,1050 M,0,200 B,1,1050 B,0,0 B,1,1050 B,0,0 B,1,1050 B,0,0} | |
| T1.PTS.STC.003.002 | Input=Terminal_Data{ B,1,1050 B,0,0 B,1,1050 B,0,0 B,1,1050 B,0,0 M,1,1050 M,0,200 M,1,1050 M,0,0 M,1,1050 M,0,200} | Output=Settled_Bus_Fee.txt{3150,201412230304,B} Settled_Metro_Fee.txt{3550,201412230904,M} |
| T1.PTS.STC.003.003 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,1050 M,0,0 B,1,1050 B,0,0 M,1,1050 M,0,200 B,1,1050 B,0,0 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{3150,201412251408,B} Settled_Metro_Fee.txt{3550,201412251736,M} |
| T1.PTS.STC.003.004 | Input=Terminal_Data{ | Output=Settled_Bus_Fee.txt{1575,201412270712,B} |

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| | B,1,1050 B,0,0 M,1,0 M,0,0 B,1,1050 B,0,0} | Settled_Metro_Fee.txt{525,201412270312,M} |
| T1.PTS.STC.003.005 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,0 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1575,201412281448,B} Settled_Metro_Fee.txt{525,201412281144,M} |
| T1.PTS.STC.003.006 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{590,201501020136,B} Settled_Metro_Fee.txt{1809,201501020600,M} |
| T1.PTS.STC.003.007 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1640,201501031936,B} Settled_Metro_Fee.txt{759,201501031448,M} |
| T1.PTS.STC.003.008 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,0 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1575,201501041432,B} Settled_Metro_Fee.txt{525,201501040952,M} |
| T1.PTS.STC.003.009 | Input=Terminal_Data{ | Output=Settled_Bus_Fee.txt{525,201501060240,B} |

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| | M,1,1050 M,0,0 B,1,0 B,0,0 M,1,1050 M,0,0} | Settled_Metro_Fee.txt{1575,201501060712,M} |
| T1.PTS.STC.003.010 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,300 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1809,201501091512,B} Settled_Metro_Fee.txt{590,201501090144,M} |
| T1.PTS.STC.003.011 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{759,201501111408,B} Settled_Metro_Fee.txt{1640,201501111808,M} |
| T1.PTS.STC.003.012 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,0 B,0,0 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{820,201501140224,B} Settled_Metro_Fee.txt{1578,201501140608,M} |
| T1.PTS.STC.003.013 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,0 B,0,0 | Output=Settled_Bus_Fee.txt{1870,201501121456,B} Settled_Metro_Fee.txt{528,201501121032,M} |

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| | B,1,1050 B,0,0} | |
| T1.PTS.STC.003.014 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,0 B,0,200 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{975,201501171456,B} Settled_Metro_Fee.txt{1623,201501171808,M} |
| T1.PTS.STC.003.015 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,0 B,0,200 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{2025,201501201304,B} Settled_Metro_Fee.txt{573,201501200304,M} |
| T1.PTS.STC.003.016 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,0 M,1,0 M,0,0 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{350,201501211704,B} Settled_Metro_Fee.txt{1750,201501212144,M} |
| T1.PTS.STC.003.017 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,0 M,1,0 M,0,0 | Output=Settled_Bus_Fee.txt{1400,201501221200,B} Settled_Metro_Fee.txt{700,201501220936,M} |

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| | B,1,1050 B,0,0} | |
| T1.PTS.STC.003.018 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,200 M,1,0 M,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{1400,201501221200,B} Settled_Metro_Fee.txt{700,201512200936,M} |
| T1.PTS.STC.003.019 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,200 M,1,0 M,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{530,201501241640,B} Settled_Metro_Fee.txt{2068,201501241832,M} |
| T1.PTS.STC.003.020 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 M,0,0 B,1,0 B,0,200 M,1,0 M,0,300 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1580,201501252248,B} Settled_Metro_Fee.txt{1018,201501252016,M} |
| T1.PTS.STC.003.021 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 M,1,1750 | Output=Settled_Bus_Fee.txt{525,201501261544,B} Settled_Metro_Fee.txt{2475,201501261608,M} |

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| | M,0,200} | |
| T1.PTS.STC.003.022 | Input=Terminal_Data{ M,1,1750 M,0,200 M,1,1050 M,0,200} | Output=Settled_Bus_Fee.txt{0,,B} Settled_Metro_Fee.txt{3200,201501280312,M} |
| T1.PTS.STC.003.023 | Input=Terminal_Data{ M,1,1750 M,0,200 B,1,0 B,0,200 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{1889,201501302000,B} Settled_Metro_Fee.txt{1310,201501301056,M} |
| T1.PTS.STC.003.024 | Input=Terminal_Data{ B,1,1750 B,0,0 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{2800,201502040216,B} Settled_Metro_Fee.txt{0,,M} |
| T1.PTS.STC.003.025 | Input=Terminal_Data{ B,1,1750 B,0,0 M,1,0 M,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{1157,201502060512,B} Settled_Metro_Fee.txt{1942,201502060616,M} |
| T1.PTS.STC.003.026 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 B,1,1650 B,0,0} | Output=Settled_Bus_Fee.txt{2175,201502090616,B} Settled_Metro_Fee.txt{525,201502090552,M} |

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| T1.PTS.STC.003.027 | Input=Terminal_Data{ M,1,1650 M,0,0 M,1,1050 M,0,200} | Output=Settled_Bus_Fee.txt{0,,B} Settled_Metro_Fee.txt{2900,2015} |
| T1.PTS.STC.003.028 | Input=Terminal_Data{ M,1,1650 M,0,0 B,1,0 B,0,200 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{} Settled_Metro_Fee.txt{} |
| T1.PTS.STC.003.029 | Input=Terminal_Data{ B,1,1650 B,0,0 B,1,1050 B,0,0} | Output=Settled_Bus_Fee.txt{2700,201502150944,B} Settled_Metro_Fee.txt{0,,M} |
| T1.PTS.STC.003.030 | Input=Terminal_Data{ B,1,1650 B,0,0 M,1,0 M,0,300 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{1072,201502170904,B} Settled_Metro_Fee.txt{1927,201502171024,M} |
| T1.PTS.STC.003.031 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 B,1,1650 M,1,1050 M,0,0} | Output=Settled_Bus_Fee.txt{2175,201502300928,B} Settled_Metro_Fee.txt{1575,201502300952,M} |
| T1.PTS.STC.003.032 | Input=Terminal_Data{ M,1,1050 B,1,1250 | Output=Settled_Bus_Fee.txt{975,201502231136,B} Settled_Metro_Fee.txt{3373,201502231200,M} |

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| | B,0,0 M,1,0 M,0,300 B,1,0 M,1,1750} | |
| T1.PTS.STC.003.033 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,1050 B,0,0 M,1,0} | Output=Settled_Bus_Fee.txt{525,201502251552,B} Settled_Metro_Fee.txt{1575,201502261640,B} |
| T1.PTS.STC.003.034 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 M,1,1050} | Output=Settled_Bus_Fee.txt{590,201502261640,B} Settled_Metro_Fee.txt{1809,201502261728,M} |
| T1.PTS.STC.003.035 | Input=Terminal_Data{ M,1,1050 M,0,0 B,1,0 B,0,0 B,1,1050} | Output=Settled_Bus_Fee.txt{1575,201502271624,B} Settled_Metro_Fee.txt{525,201502271552,M} |
| T1.PTS.STC.003.036 | Input=Terminal_Data{ B,1,1050 B,0,0 M,1,0 M,0,300 B,1,0} | Output=Settled_Bus_Fee.txt{820,201502281104,B} Settled_Metro_Fee.txt{528,201502281048,M} |
| T1.PTS.STC.004.000 | Input=Clock(YYYYMMDDHHmm | Output=Settled_Bus_Fee.txt{Settled_Fee,Last_Tag,Transportation} |

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| | =YYYYMMDD0000) | Settled_Metro_Fee.txt{Settled_Fee,Last_Tag,Transportation} OK.txt{NULL} |
| T1.PTS.STC.005.000 | Input= Day1{정산완료 신호}, Day2{NULL} | Output=Day1.Terminal_Data 정상 생성 Day2.Terminal_Data 정상 생성 |
| T1.PTS.STC.006.000 | Input=Clock(YYYYMMDDHHmm =YYYYMMDD0000) 시스템 상 하루는 180초 이므로, 180초 마다 HHmm는 0000이 된다. | Output=Settled_Bus_Fee.txt{Settled_Fee,Last_Tag,Transportation} Settled_Metro_Fee.txt{Settled_Fee,Last_Tag,Transportation} OK.txt{NULL} |
| T1.PTS.STC.007.000 | Input=Tag | Output=Card_Data.txt{Tag_time,Transportation,On_Board,Balance,TerminalID_Count} |
| T1.PTS.STC.007.001 | Input=Tag | Output=Terminal_Data.txt{Tag_time,Transportation,On_Borad,Fee,TerminalID_Count} |
| T1.PTS.STC.007.002 | Input=Clock(YYYYMMDDHHmm =YYYYMMDD0000) | Output=Settled_Fee.txt{Last_Tag,Settled_Fee,Transportation} |