Material Transport System

IH JEONG / KOREA
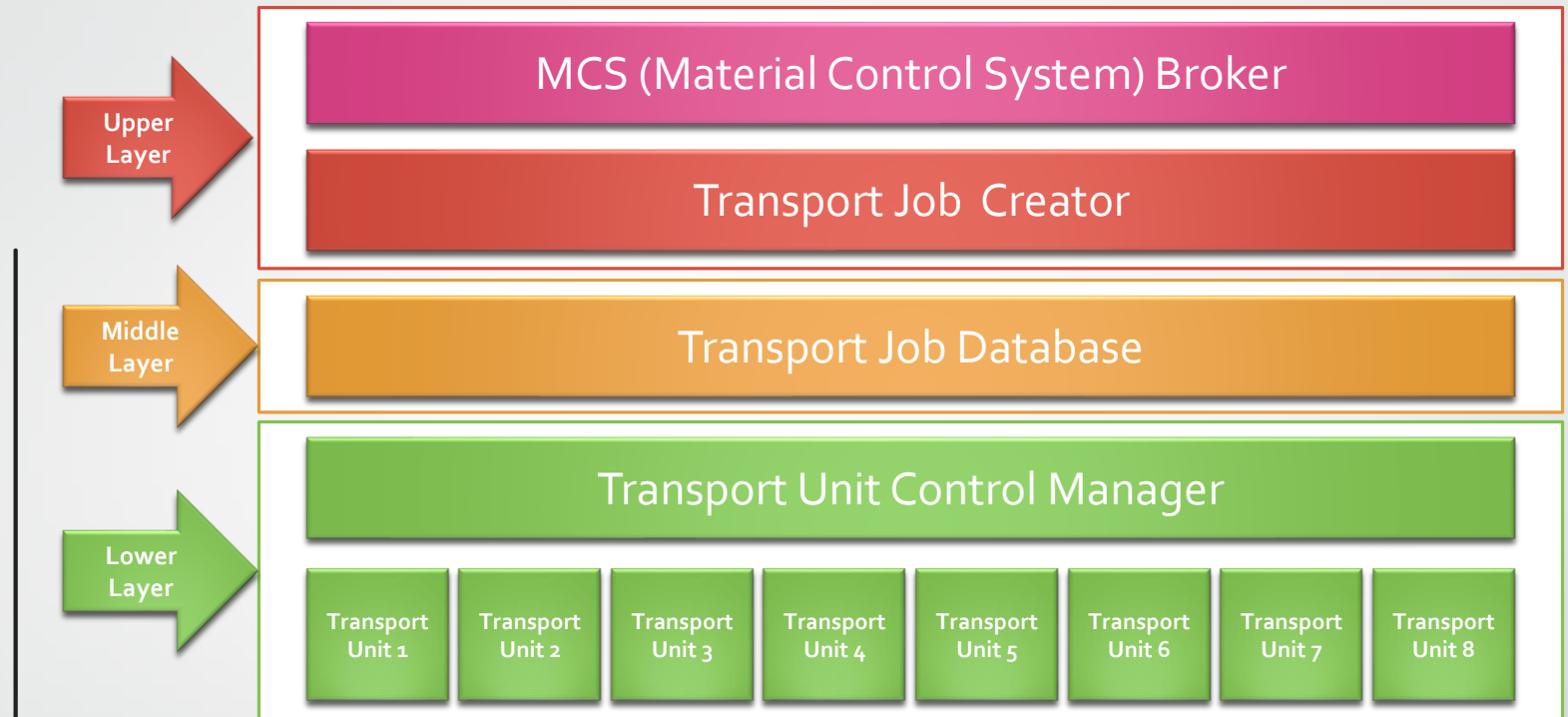
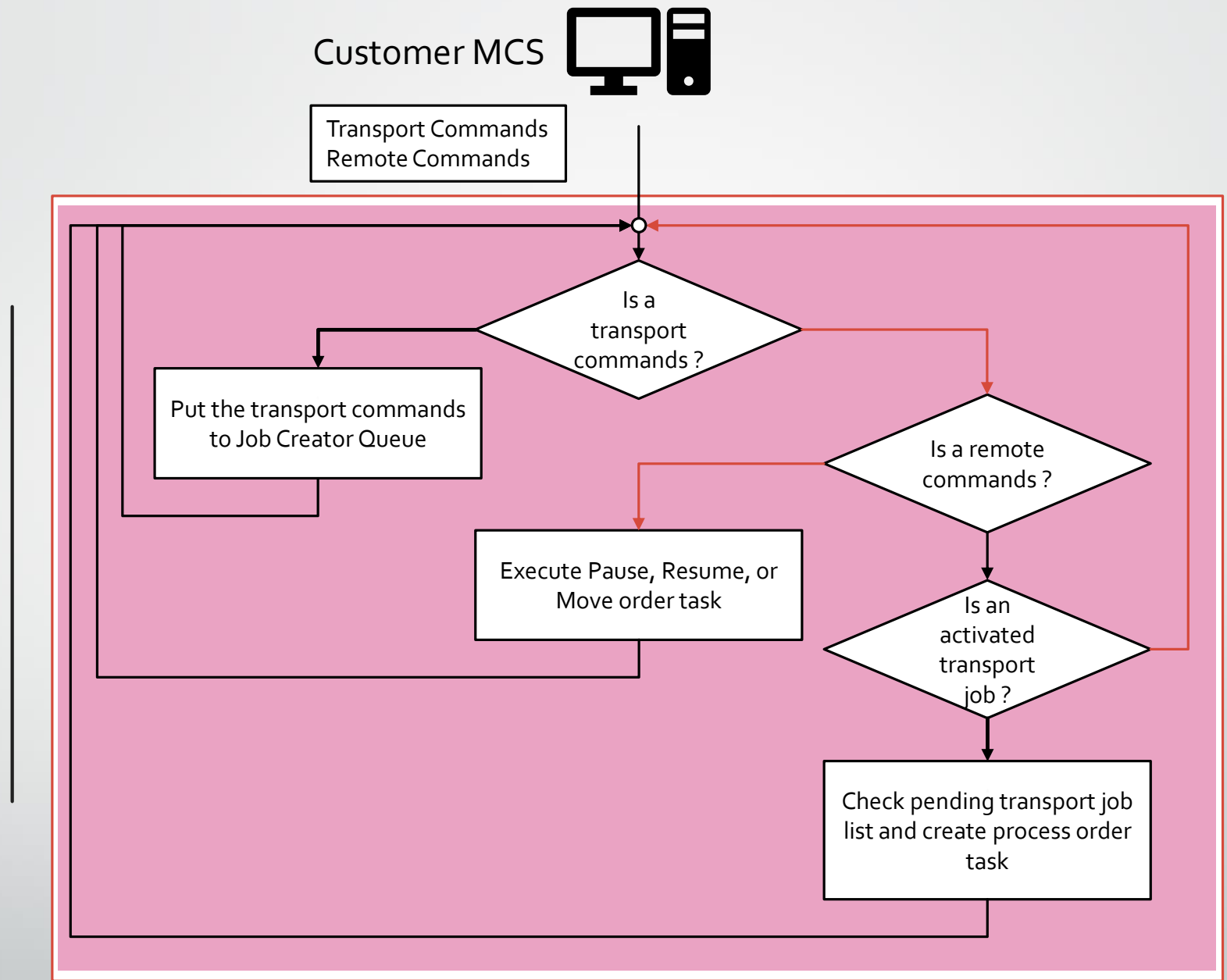Provide Scalable Management Solution

Revision 1.0.0.1

Agendas

- Structure of MTS
- Structure of MCS (Material Control System) Broker
- Structure of Transport Job Creator
- Structure of Transport Job Database
- Structure of Transport Unit Control Manager
- Goals of MTS
- Applied design concepts

Structure of MTS

Upper Layer → MCS (Material Control System) Broker / Transport Job Creator

Middle Layer → Transport Job Database

Lower Layer → Transport Unit Control Manager

Transport Unit 1 | Transport Unit 2 | Transport Unit 3 | Transport Unit 4 | Transport Unit 5 | Transport Unit 6 | Transport Unit 7 | Transport Unit 8
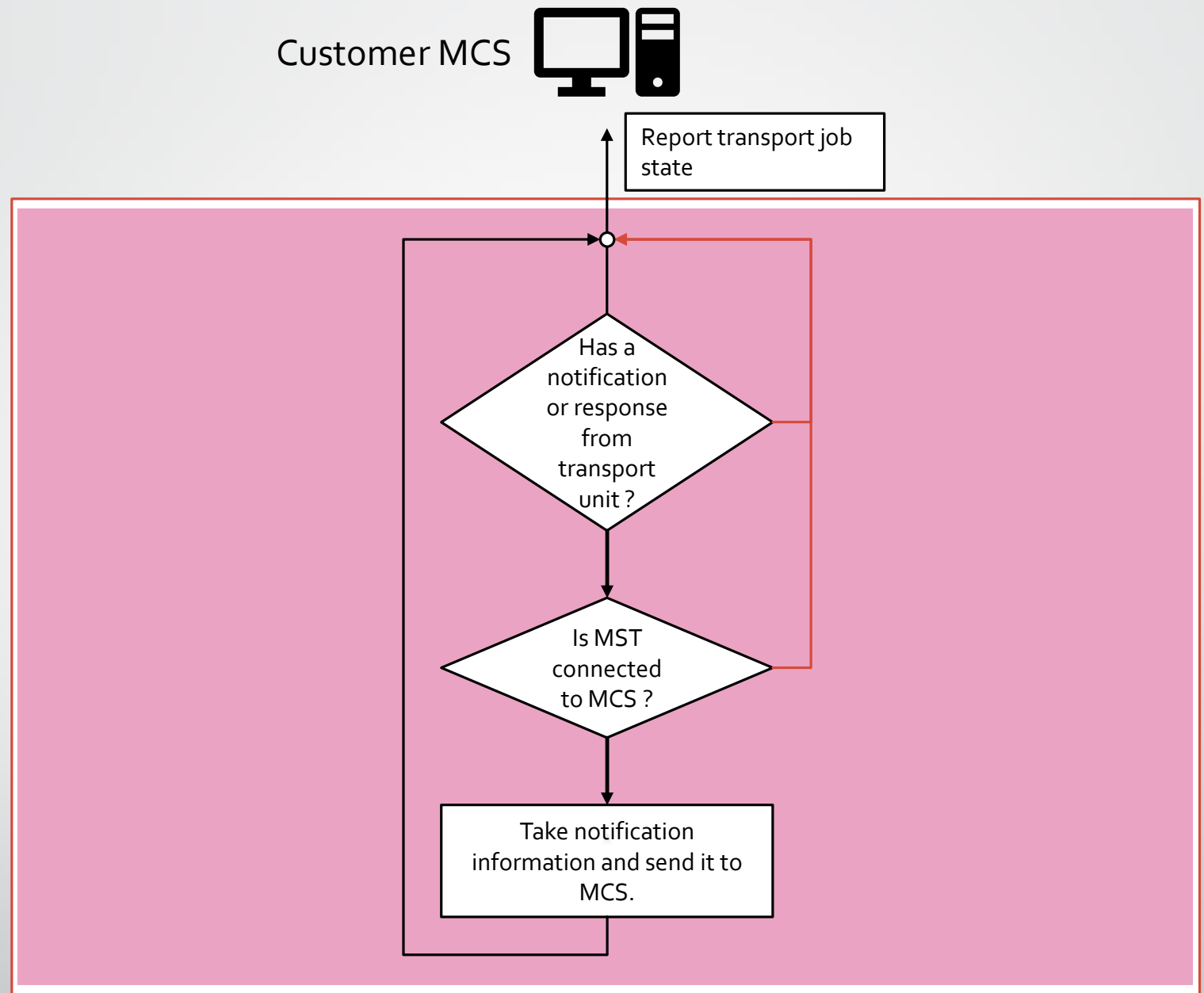
- MTS (Material Transport System) 은 역할에 따라서 3 개의 층으로 나눈다.
- 상위 (MCS Broker Layer)
  고객사 MCS (Material Control System) Broker 와 Transport Job Creator 로 구성된다.
- 중간 (Transport Job Database Layer)
  Transport Job 을 유지하고, 상태를 관리한다.
- 하위 (Transport Unit Control Manager Layer)
  Transport Job 을 수행하는 Unit (최대 8대 반송 로봇) 들의 Transport Job 을 제 및 관리한다.
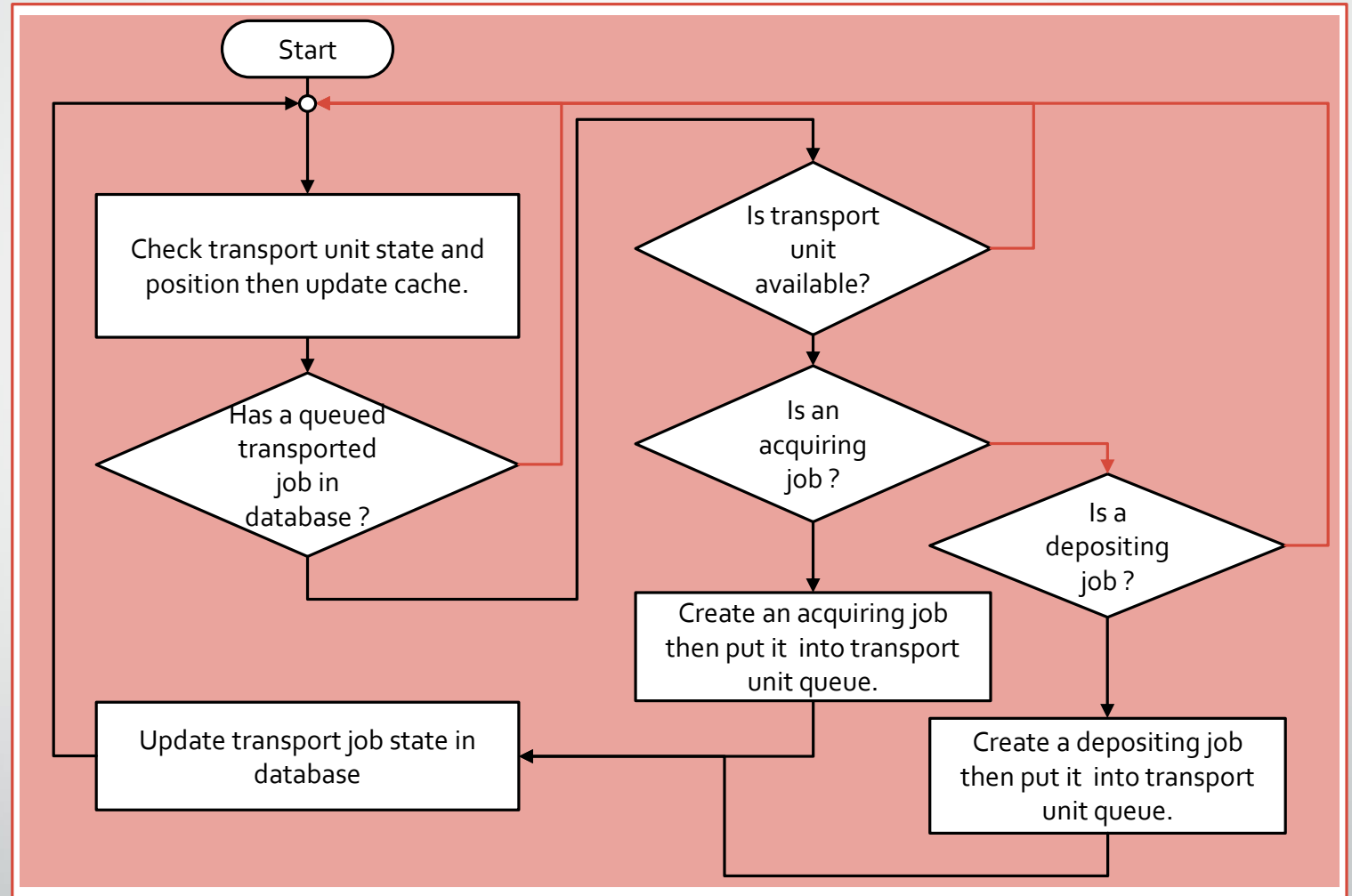
Structure of MCS Broker

Customer MCS

Transport Commands
Remote Commands

Is a transport commands ?

Put the transport commands to Job Creator Queue

Is a remote commands ?

Execute Pause, Resume, or Move order task

Is an activated transport job ?

Check pending transport job list and create process order task

- MCS Broker 의 Remote Commands 별 Task 호출

Structure of MCS Broker (Contd.)

Customer MCS

Report transport job state

Has a notification or response from transport unit ?

Is MST connected to MCS ?

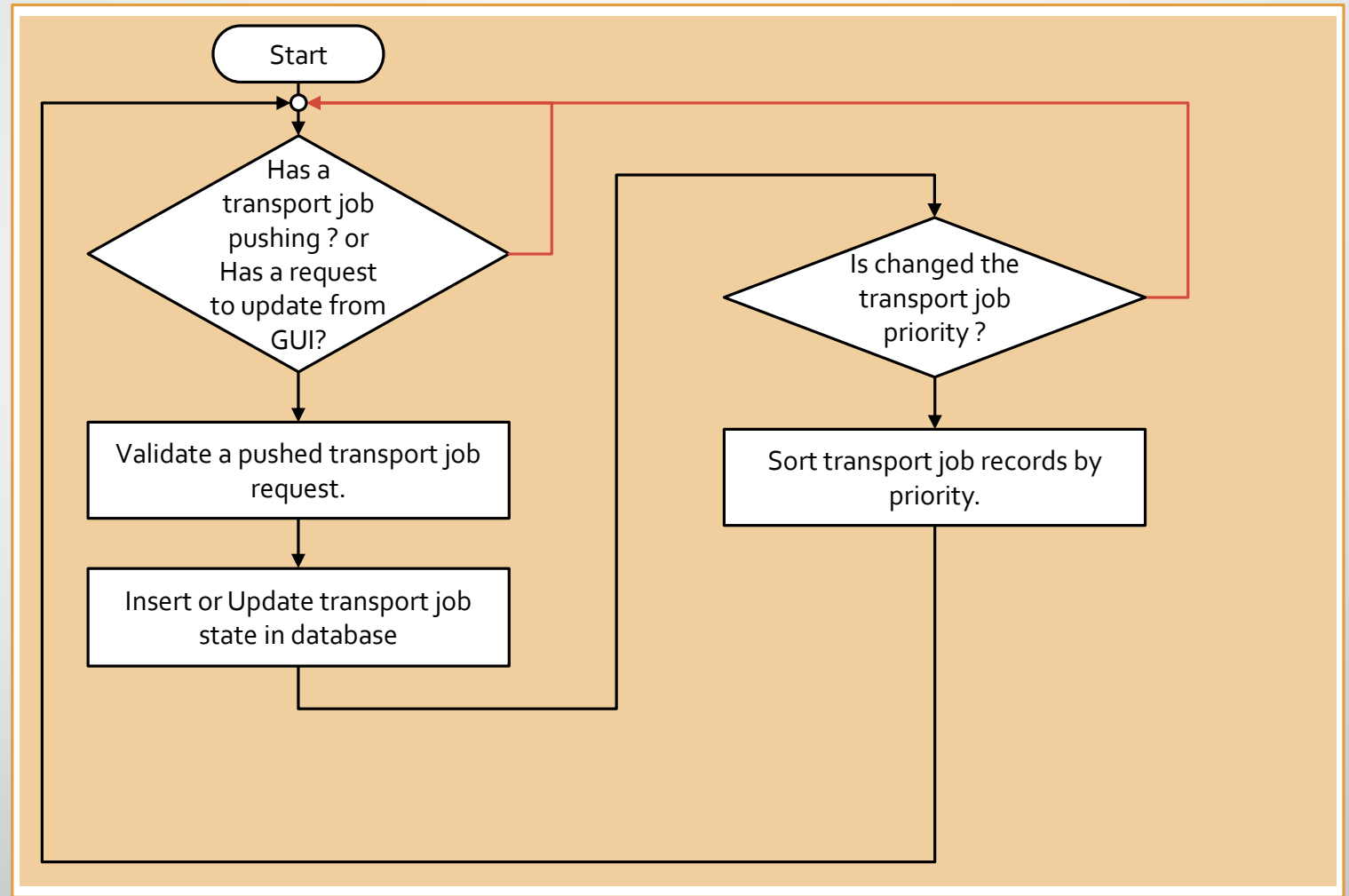Take notification information and send it to MCS.

- Transport unit 의 응답과 이벤트를 MCS 로 전송.
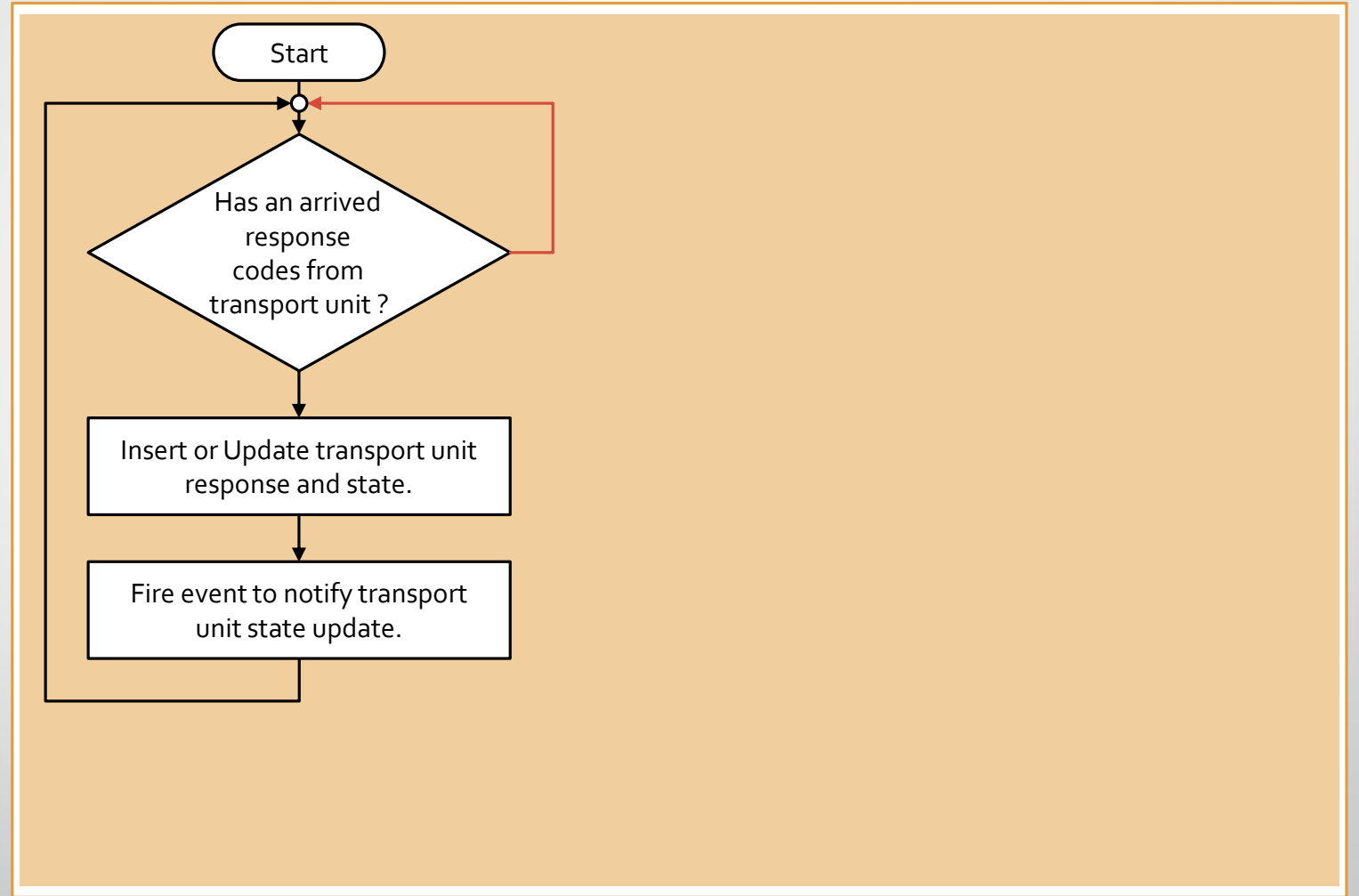
Structure of Transport Job Creator

- Transport Job Creator 는 Transport Unit 상태와 Transport Job pending 여부에 따라서, RUN 상태일 경우 항시 Transport Job 을 생성 배정한다.
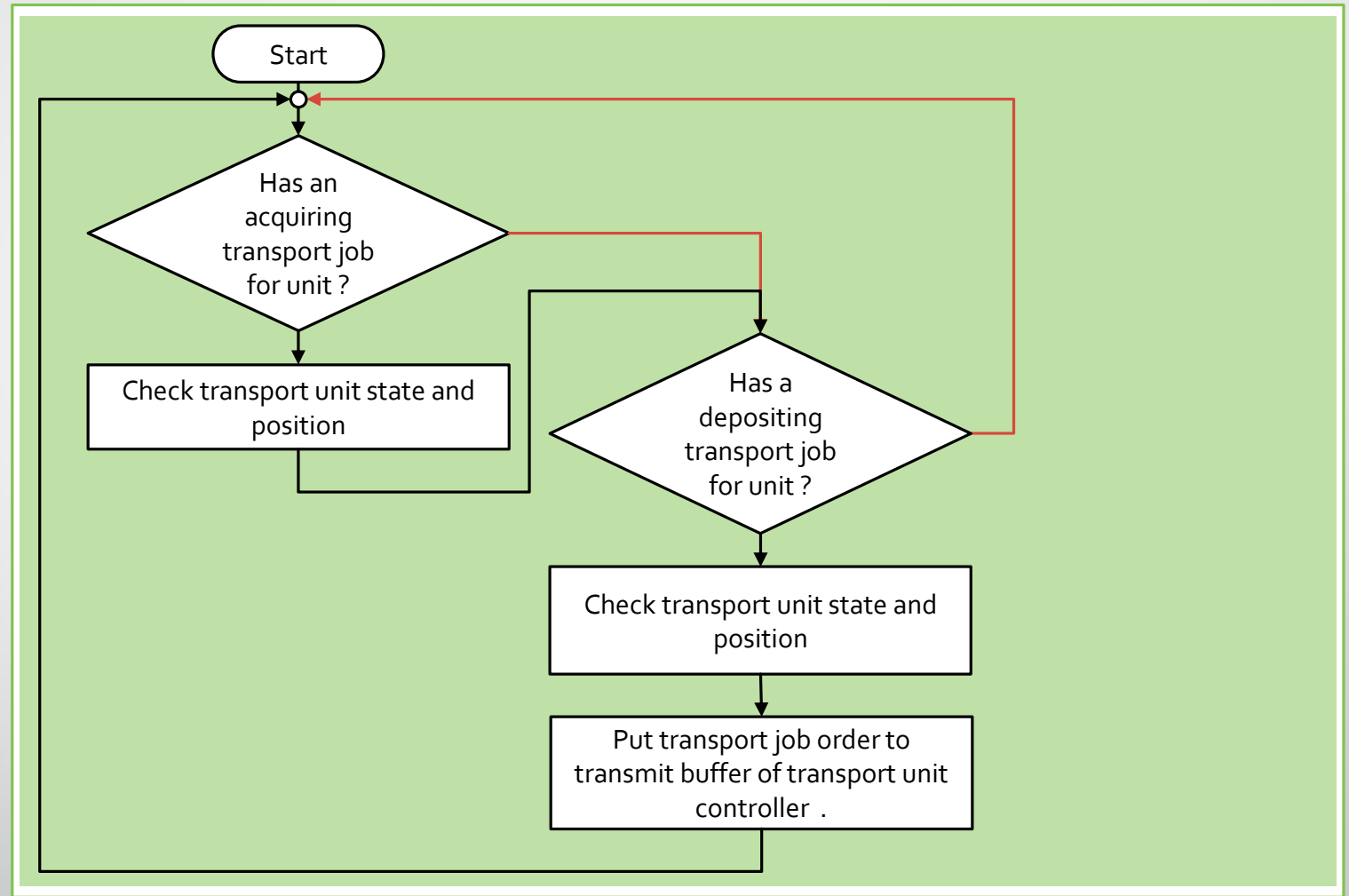
Structure of Transport Job Database

- Transport Job Database 는 transport job pushing 이 있을 경우, transport job 을 등록하며, 관리자의 transport job 우선 순위 변경에 pending 순서를 변경한다.

# Structure of Transport Job Database (Contd.)

- Transport Job Database 는 transport unit state 가 변경되면, 이를 update 하고, MCS Broker 에게 이를 통지한다.

Structure of Transport Unit Control Manager

- Transport Unit Control Manager 는 Transport Job Creator 에 의해 생성된 transport job 을 transport unit controller 에게 전달하고, transport unit controller thread 에 반송 명령을 전달한다.

Structure of Transport Unit Control Manager (Contd.)
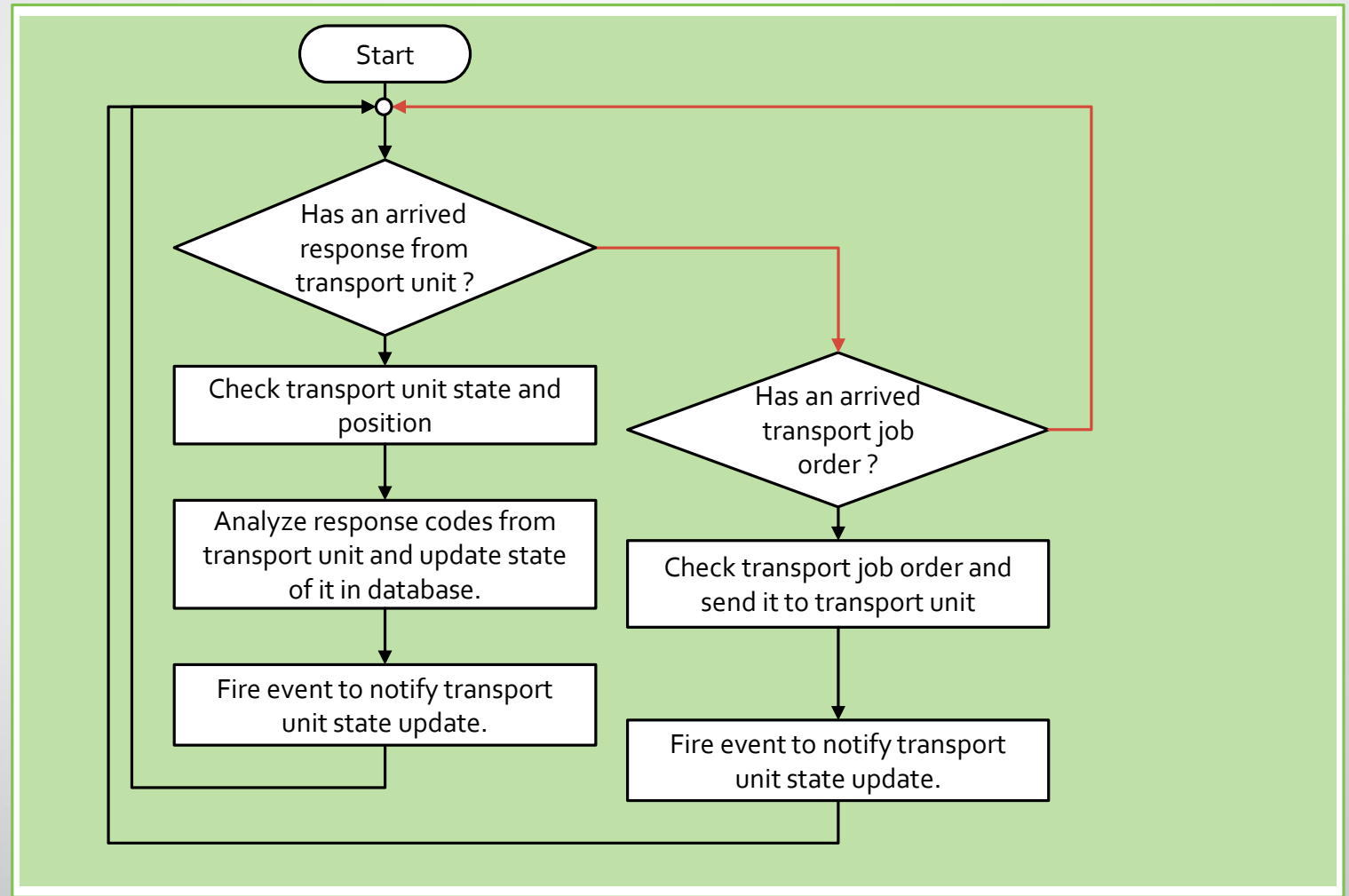
- Transport Unit Controller 의 응답은 transport job database 에 각 transport unit state 테이블에 update 된다.

Goals of MTS

- Provides distributed process task by process modules.

- Provides stable server modules.

- Provides runtime monitoring and service restart features.

- Provides extendable transport unit control manager to manage 8 vehicles. (One license supports to control 8 vehicles.)

- Provides database server divide from MTS to support heavy transaction.

- Provides external schema synchronizing.

- Provides transport job Creator and customizing of job creation by option.

- Provides MCS Broker interface and customizing.

Notice: The 1st phase goals are Marked items by red color.
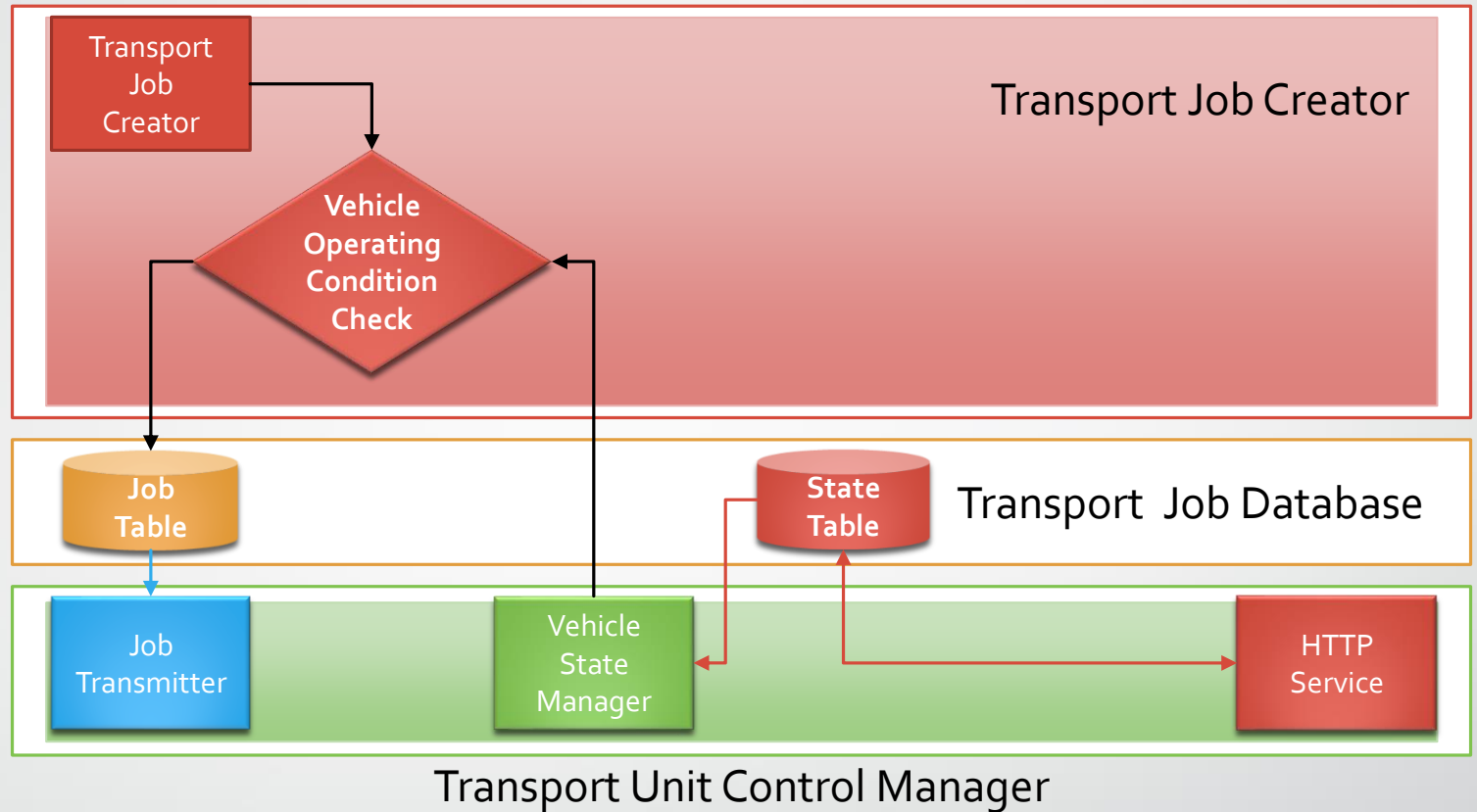
Applied Design Concepts

- This project contained general mediator device concept. The detail system structure and implementation plan notes will be added with below technical information.
  - MSMQ (Microsoft Message Queue)
  - MSSQL Server (Microsoft Database Server Express)
  - SECS/GEM specification for AMHS-AGV (Samsung V1.8)

Data Flow of Transport Unit Control Manager
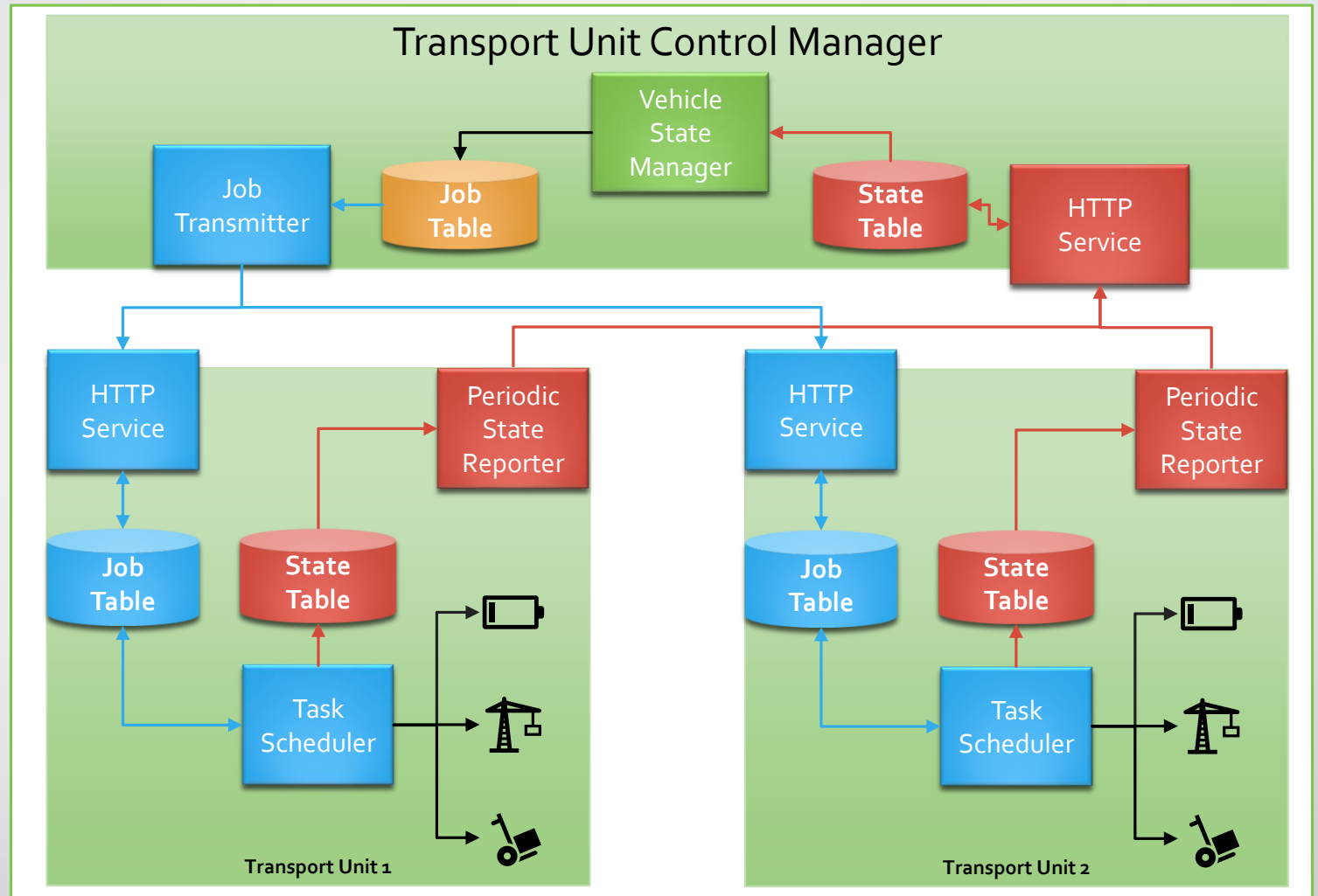
- Transport Unit 과 Transport Unit Control Manager 간의 데이터 및 상태 정보 연동 흐름도

Data Flow of Transport Job Database & Transport Job Creator

Transport Job Creator

Transport Job Creator

Vehicle Operating Condition Check

Transport Job Database

Job Table

State Table

Job Transmitter

Vehicle State Manager

HTTP Service

Transport Unit Control Manager

- Transport Unit Control Manager 은 각 Vehicle 의 상태 정보는 Transport Job Creator 가 참조하여, Transport Job 생성, 갱신, 삽입, 삭제, 할당 등에서 주요 정보로 사용된다.

Data Flow of MCS Broker

Customer MCS

Transport Commands
Remote Commands

MCS Broker

Host Message Parser

Transmit Data & notify events

Is already exist?

Has an event to notify?

Transport Job Creator

Peek Item

Vehicle Operating Condition Check

Fire event and toss data

MSMQ

Job Creator

Private Queue

Job Table

State Table

Transport Unit Control Manager

Job Transmitter

Vehicle State Manager

HTTP Service

- MCS Broker 는 고객사의 MCS 와 연동하며, Transport Job 생성을 위한 pending list 를 생성하고, Transport Unit Control Manager 로 부터 전달되는 event 와 데이터를 명령을 응답과 함께 고객사 MSC 로 전송한다.