Overview

The Command, Control and Communication (C3) System for railway operation draws from the extensive experience of ST Electronics and consultants in the engineering and implementation of Supervisory Control Systems and Communication Systems for major railway clients and operators.

Unlike conventional railway SCADA System, the C3 System allows complete integrated operation, allows the effective use of a Decision Support System (DSS) as an aid for the safe, efficient and effective management of railway operations, especially during emergency situations.

At the core of the C3 System is an integrated suite of modular software developed based on ST Electronics’s experience gained from working on several MRT/LRT projects with different railway operators.

This software development is based on relevant international standards, and in particular the ISO 9000 and EN50128 standards. The C3 System application runs on COTS software and hardware, which keeps the life cycle cost low.

The C3 System can be complemented with the Operation Control Centre (OCC) design services provided by ST Electronics covering operational task studies, ergonomic design of HMI and OCC.

In addition, ST Electronics is also able to offer operational consultancy services in partnership with an experienced railway operator for a comprehensive railway solution.

Features

- Friendly, secure and ergonomic user interface
- Use of standard COTS hardware and software for ease of maintenance
- Intelligent DSS for incident and emergency scenario management including fire situation on train or in tunnels, power outage etc.
- Multi-language support including chinese HMI
- Integrated communication applications including voice, data and video
- Integrated Traveler Information (TIS) System both in the stations and on-board trains
- Integrated Access Management & Security System (AMS)
- Integrated Automatic Train Supervision
- Provide technology driven and cost-effective solution from integrated railway operational perspective
- Compliance with international standards like ISO9000, EN50128 etc.
Operational Perspective

The **C3 System** design ‘marries’ the requirements of railway operators and modern technology to create a cost-effective and responsive solution for railway operation. This is in contrast to other systems which require operational elements to be built around a standard solution. Typical Railway Operations (Service Startup, Revenue Service, Shut-down) are fully supported by the **C3** solution.

With this model, Modules (Functions) can be distributed anywhere in the system and redundancy can be applied easily where required. This architecture is also highly scalable and can be adapted to suit specific requirements.

Railway Situation Management

Typically, a railway operates in 3 modes: namely Normal, Incident and Emergency modes. During normal mode of operation, the **C3 System** routinely manages the daily system startup, launching of trains, service supervision and train withdrawal at the end of revenue service.

In the course of revenue service, certain abnormalities like “Stalled Train”, or “Station On Fire” etc., may arise. These incidents or emergency situations, depending on its severity, require rapid and precise operator’s reactions under a tense environment. In support of such requirements, the **C3 System** includes a DSS tool to guide the actions of the control centre operators based on pre-defined operating steps or procedures in a controlled manner based on information received from various sources.

For instance, on detection of a “Train On Fire” emergency situation, the corresponding DSS plan will automatically be activated and a series of operator’s steps/actions will be displayed. Such steps would typically include: Select and display video of affected train to assess situation, call station staffs and emergency services on direct line, stop train services in affected sector, send appropriate emergency evacuation messages via train-borne PA and signage, identify and confirm location of affected train and select appropriate tunnel ventilation mode to facilitate evacuation of passengers etc. This systematic approach provided by the tool minimizes the chances of operator’s errors during abnormal and tense situations.

The DSS is fully configurable to suit various operating scenarios defined by the railway operator.

Specifications subject to change without prior notice.

Software Architecture

The **C3 System** software architecture builds around an Event Model as described below:

- Messages are called Events
- Events are typically system state changes, inter-process communication, and auditing Events
- The Event service is responsible for propagating Events to all relevant subscribers
- Event delivery is guaranteed by the Event service
- Modules push Events to the Event service as required
- Modules subscribe to Events in which they are interested. Modules do not know or care which other modules have subscribed to the Event

railway operation

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