SFMTA

ATCS System and Train Control Upgrade Program

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Engineering, Maintenance, and Safety Committee

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(20 Slides)

Presentation Outline

- SFMTA Overview
- What is Train Control?
- ATCS System Overview
- Current Challenges
- Roadmap for the Future

SFMTA Overview

- Over 73,000 daily boardings
- 71.5 Miles of track (5.8 Miles in tunnel)
- 9 Subway stations; 24 Surface stations
- 87 Surface stops
- 2 LRV Yards


Market St
Subway
N Judah
L Taraval
Twin
Peaks
Tunnel
J Church
T Third
K
Ingleside
M Oceanview

What is Train Control?

Primarily, train control is a **safety system** which is designed to prevent train-to-train collisions.

Generally, train control systems do not address the risk of collision between trains and other vehicles, bicycles, or pedestrians. These capabilities are currently being researched.

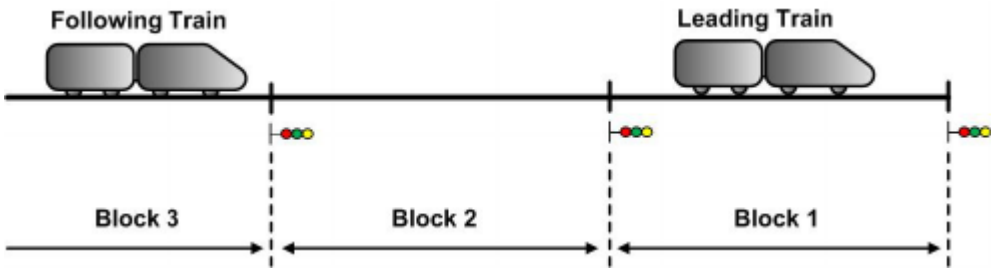
What is Train Control? (cont)

Secondarily, more modern train control systems can be used to manage rail service, giving operations staff the tools to monitor and adjust trains' speeds and dwell times to ensure the trains stay on schedule and maintain consistent headways.

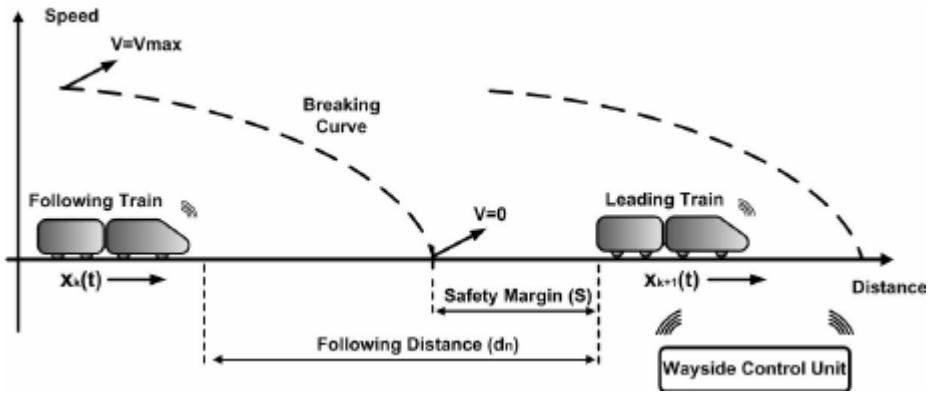
What is Train Control? (cont)

Generally, there are two types of train control:

Fixed block



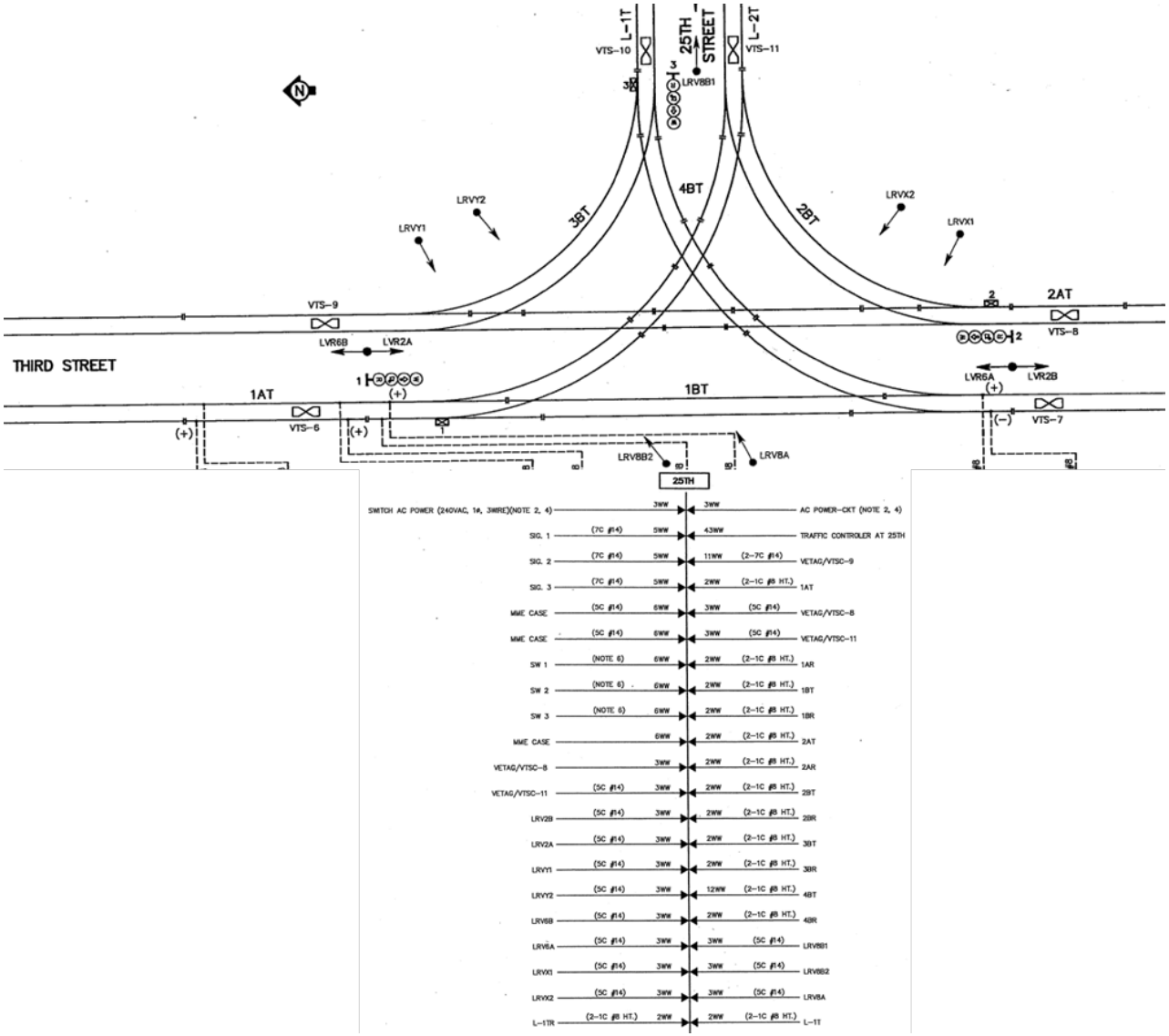
Moving block



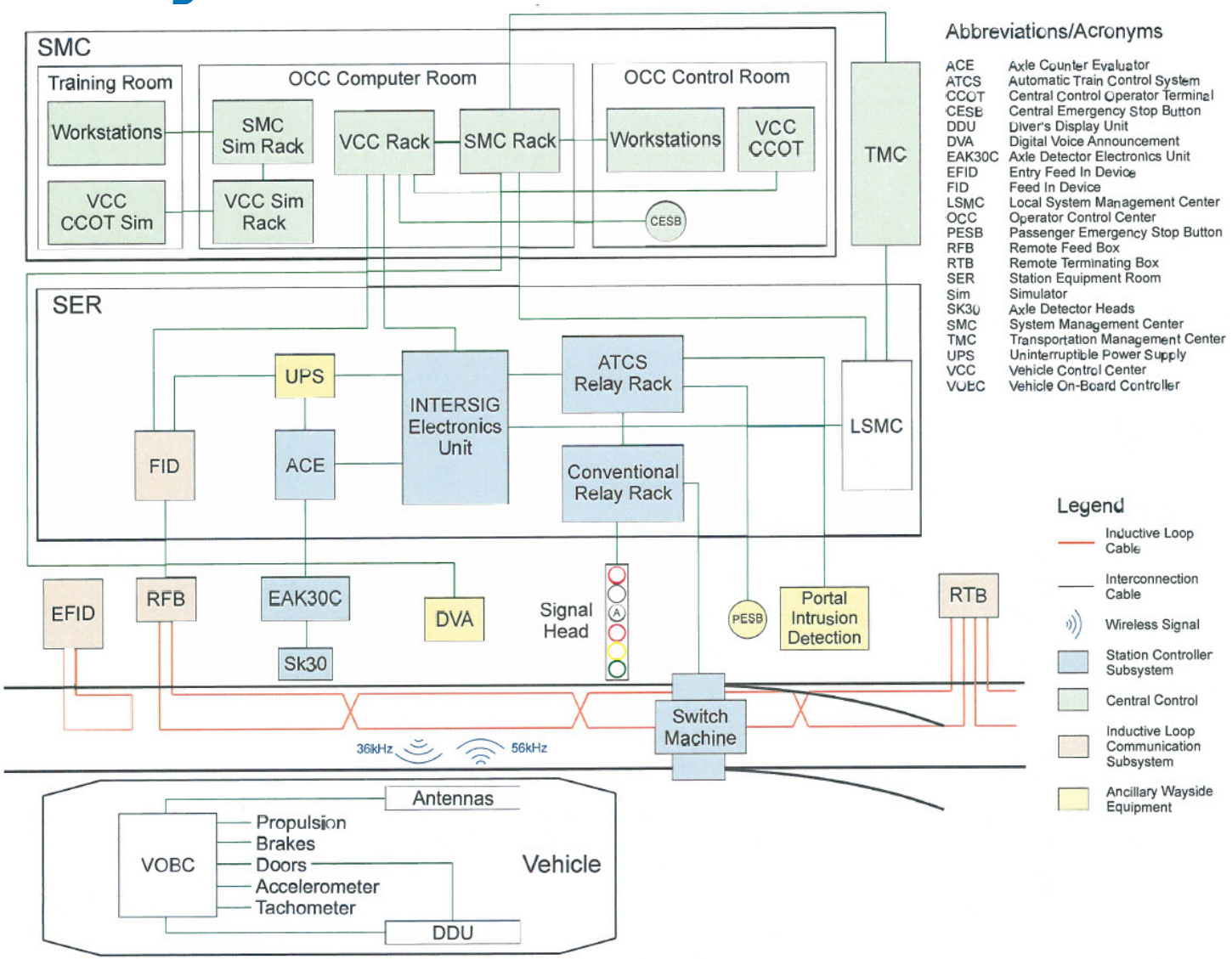
Existing Signaling Systems

- Above Ground
  - Line of sight manual operation with Transit Signals
  - VETAG for Train Operator switch position request
  - VETAG for Traffic Signal interface
  - VPI and relay based interlockings
- Market St. and new Central Subways
  - Thales Seltrac IS: loop based, with ATO
  - Secondary Train Detection using Axle Counter Blocks

A Surface Interlocking (3rd & 25th)



ATCS System Overview



VCC – Vital Control Computer

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THU 08/07/97                    VCC-CCO(Rel1.30)                    18:22:22
Authority   System                                                  F1=Help

 pbasgslr.c 153
M1.CPU1: 13:53:09      C4   C6   C8   D2   D4   D6   D8   D10  D12  V2   V4
 pbasgslr.c 184
M1.CPU1: 13:53:09 STA UA   U1   DI   DI   DI   U3   U5   U2   DI   U5   U9
 pbasgslr.c 303
M1.CPU1: 13:53:09 RES ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
 pbasgslr.c 363
M1.CPU1: 13:53:10 SIGNAL STATUS/RESERVATION
 pbasgslr.c 153
M1.CPU1: 13:53:10      V8   V12  V14  E2   E4   E6   E8   T2   T4   T6   T8
 pbasgslr.c 184
M1.CPU1: 13:53:10 STA DI   U1   DI   DI   DI   DI   DI   DI   DI   DI   DI
 pbasgslr.c 303
M1.CPU1: 13:53:10 RES ---  ---  ---  ---  ---  ---  ---  ---  ---  ---  ---
 pbasgslr.c 363
M1.CPU1: 13:53:12 SIGNAL STATUS/RESERVATION
 pbasgslr.c 153
M1.CPU1: 13:53:12      T10  T12  T14  T16  T20  T22  T24  T32  T18
 pbasgslr.c 184
M1.CPU1: 13:53:12 STA DI   DI   DI   DI   DI   DI   DI   DI   DI
 pbasgslr.c 303
M1.CPU1: 13:53:12 RES ---  ---  ---  ---  ---  ---  ---  ---  ---
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PG 1
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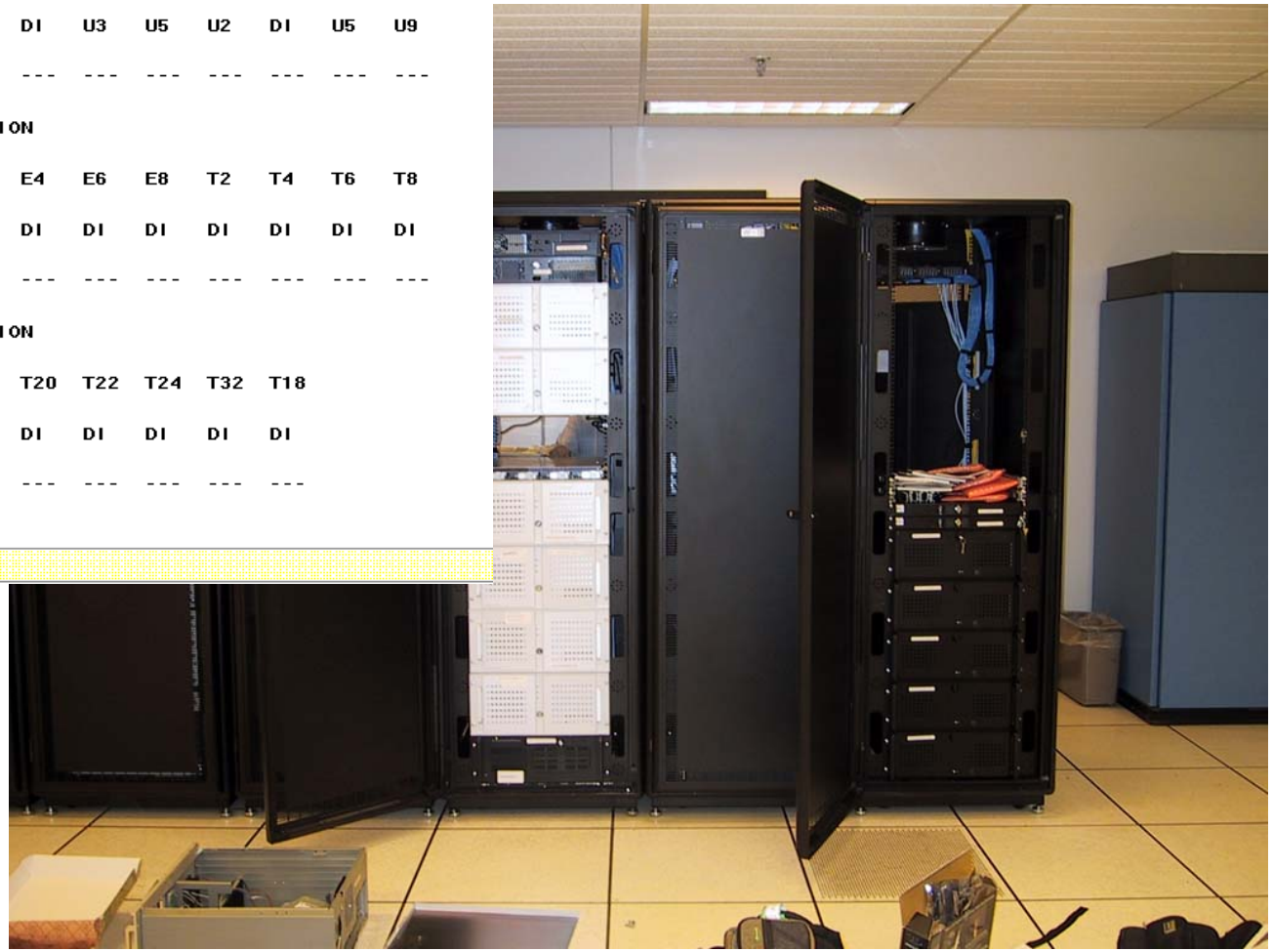
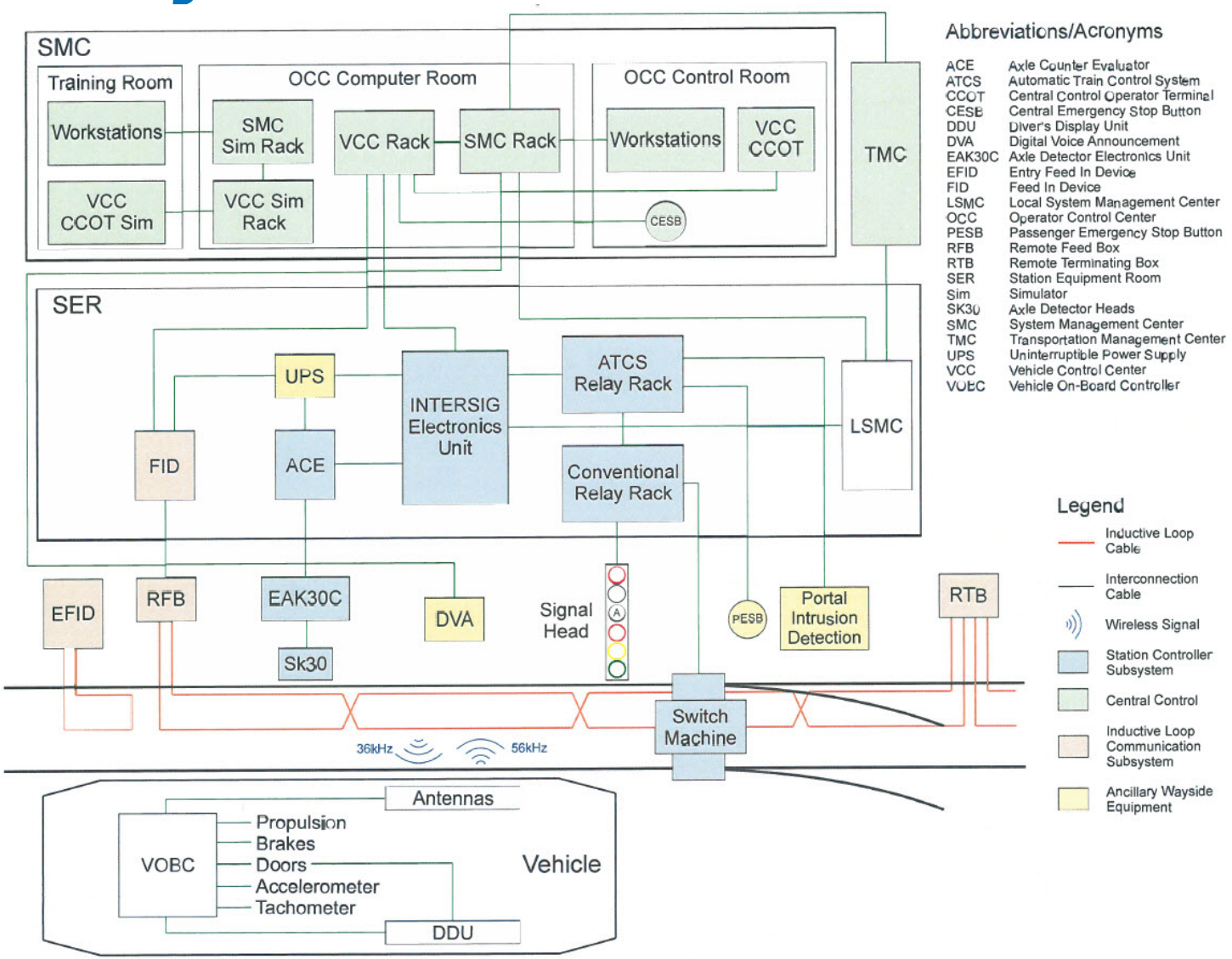
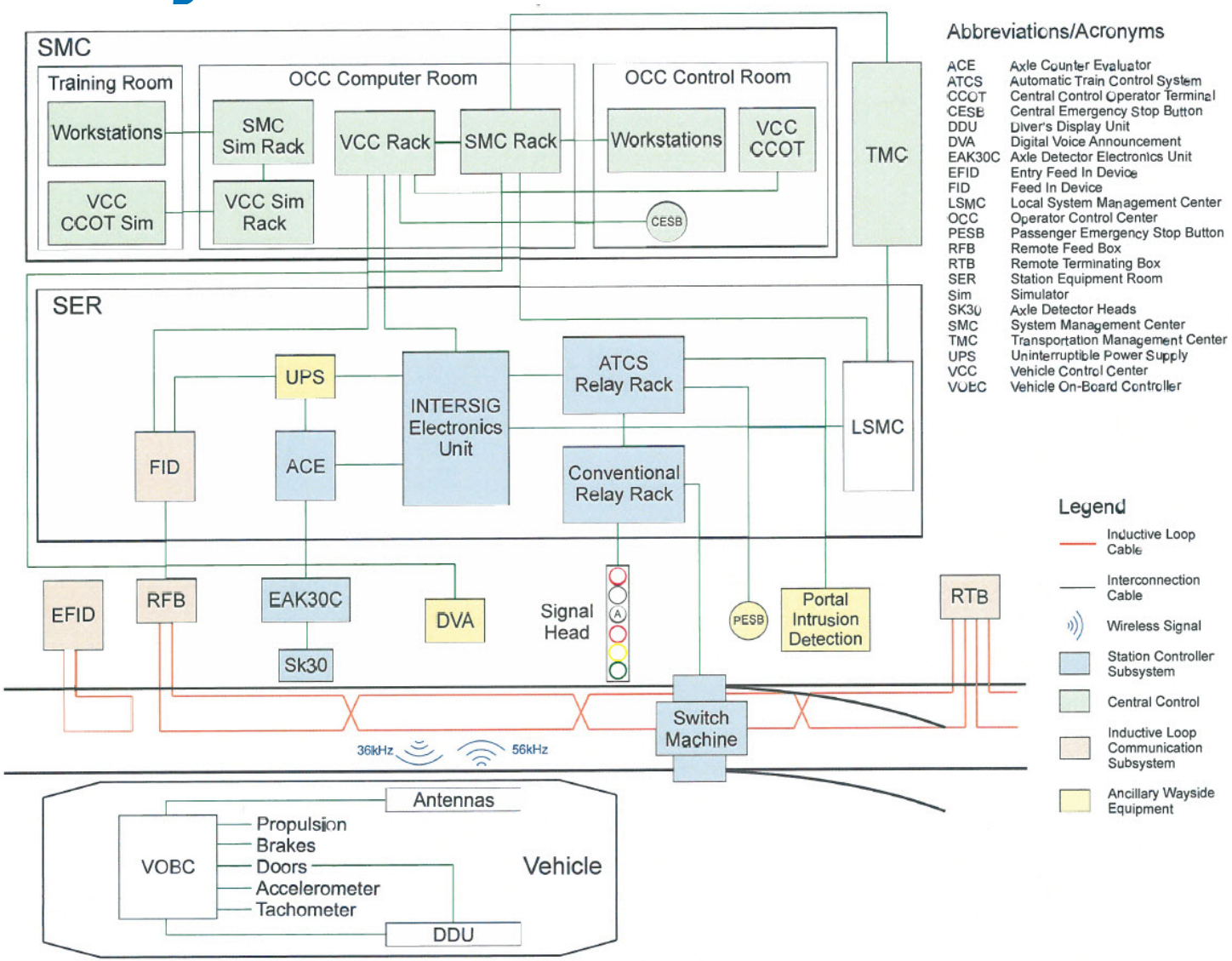


ATCS System Overview

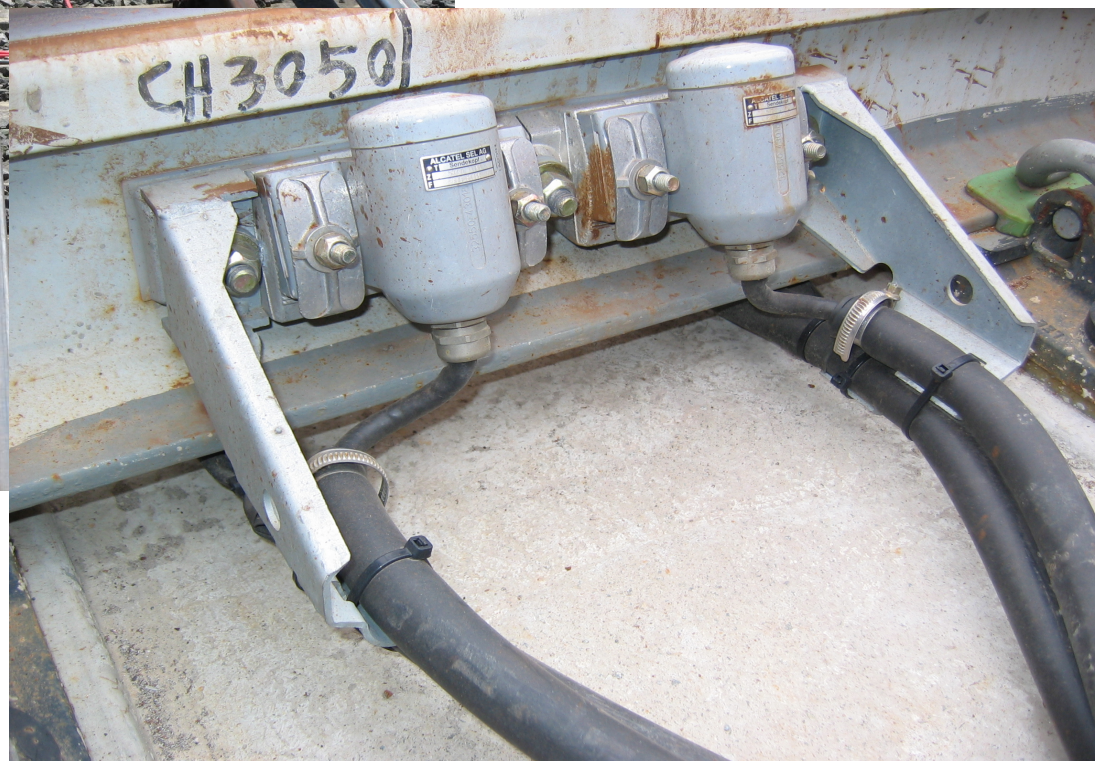


Station Controllers

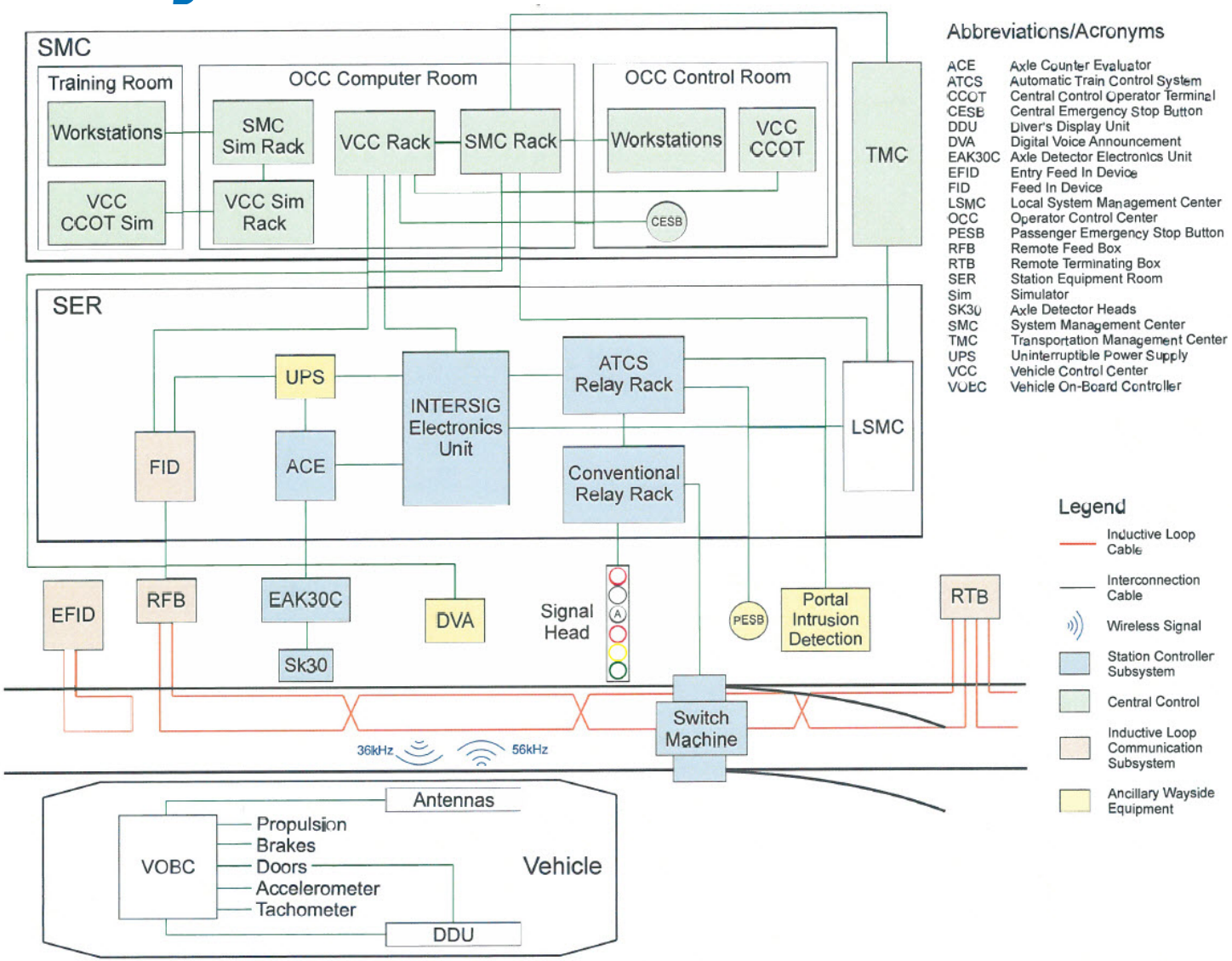
ATCS System Overview



Wayside Equipment

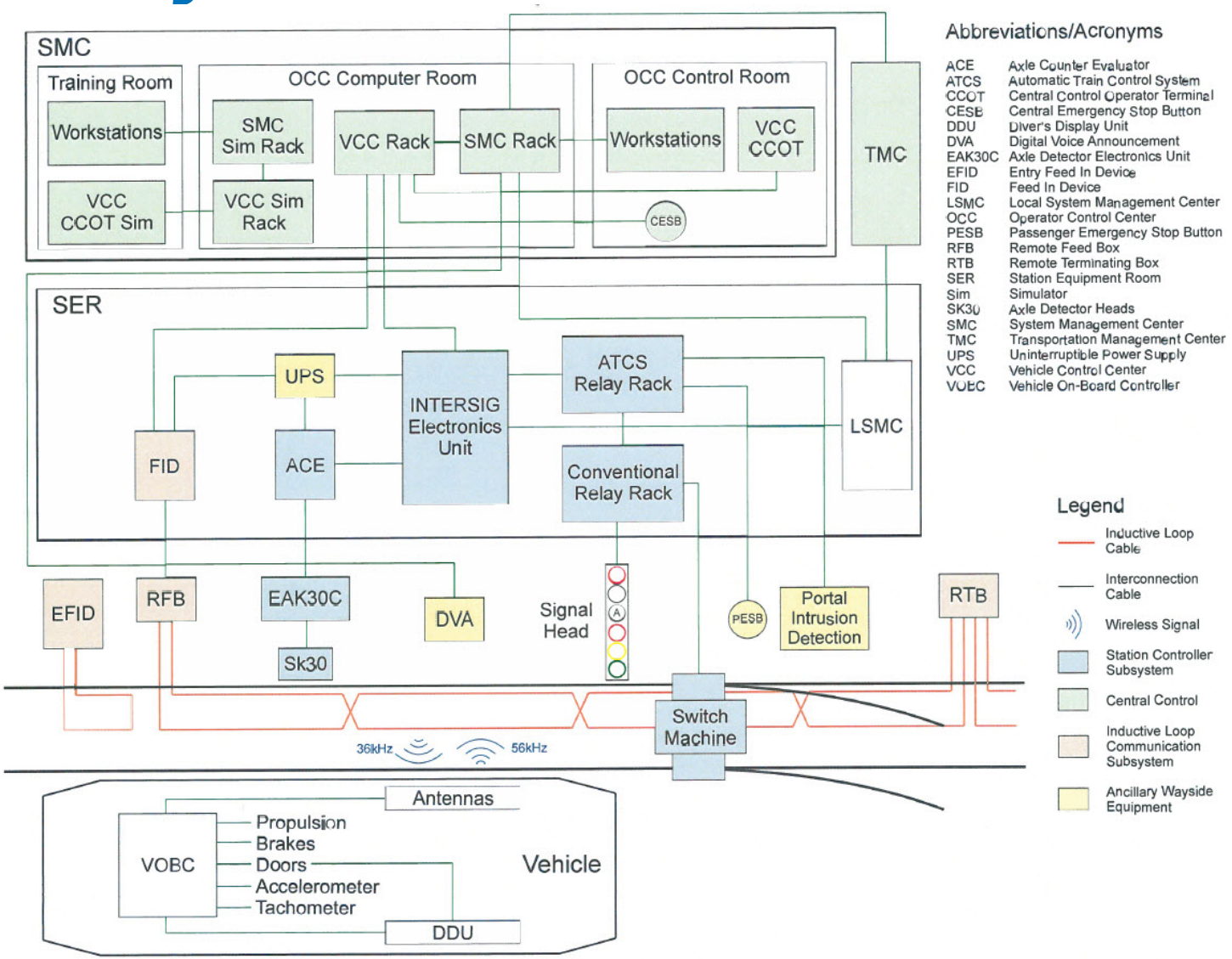


ATCS System Overview

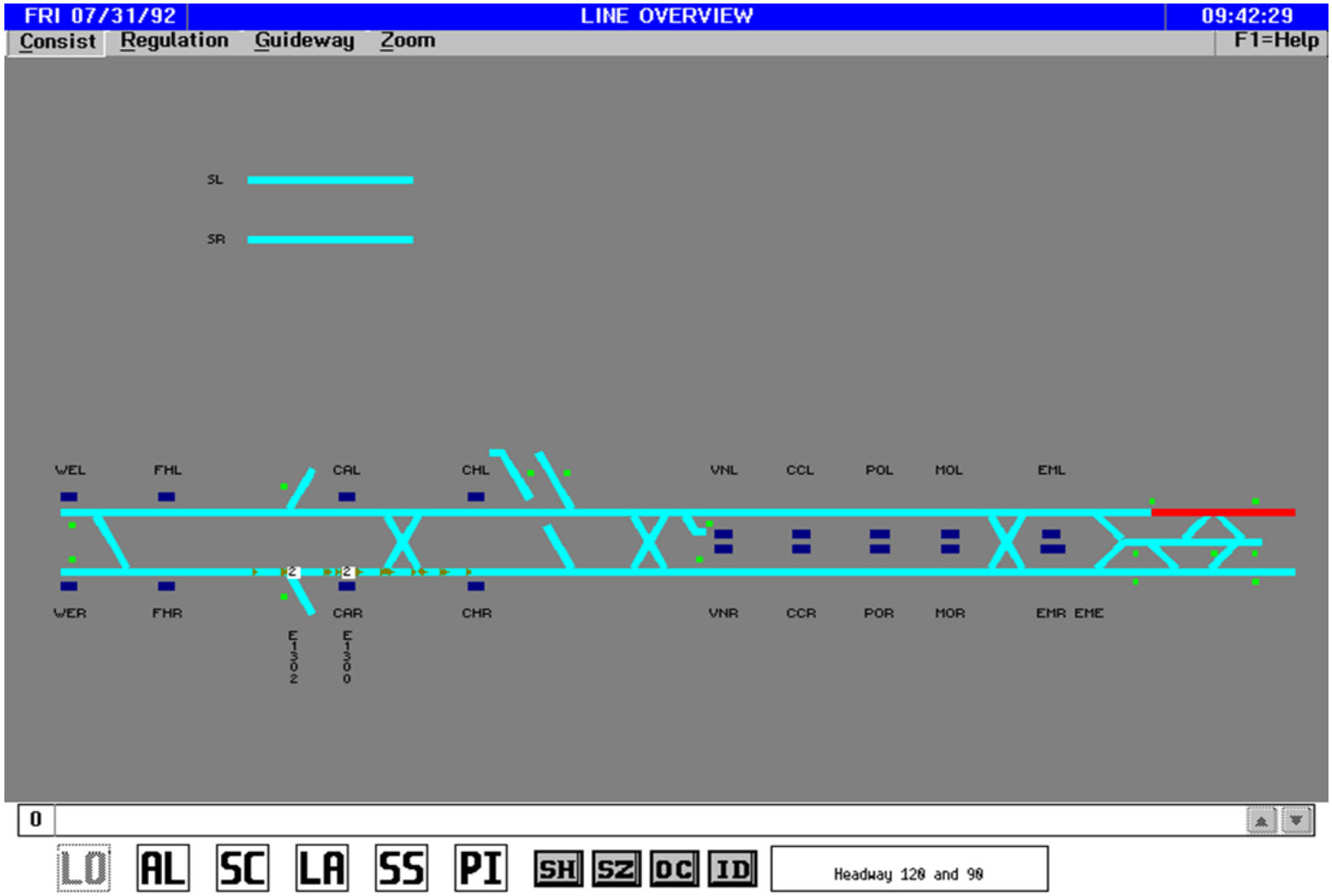


Carborne Equipment (VOBC)

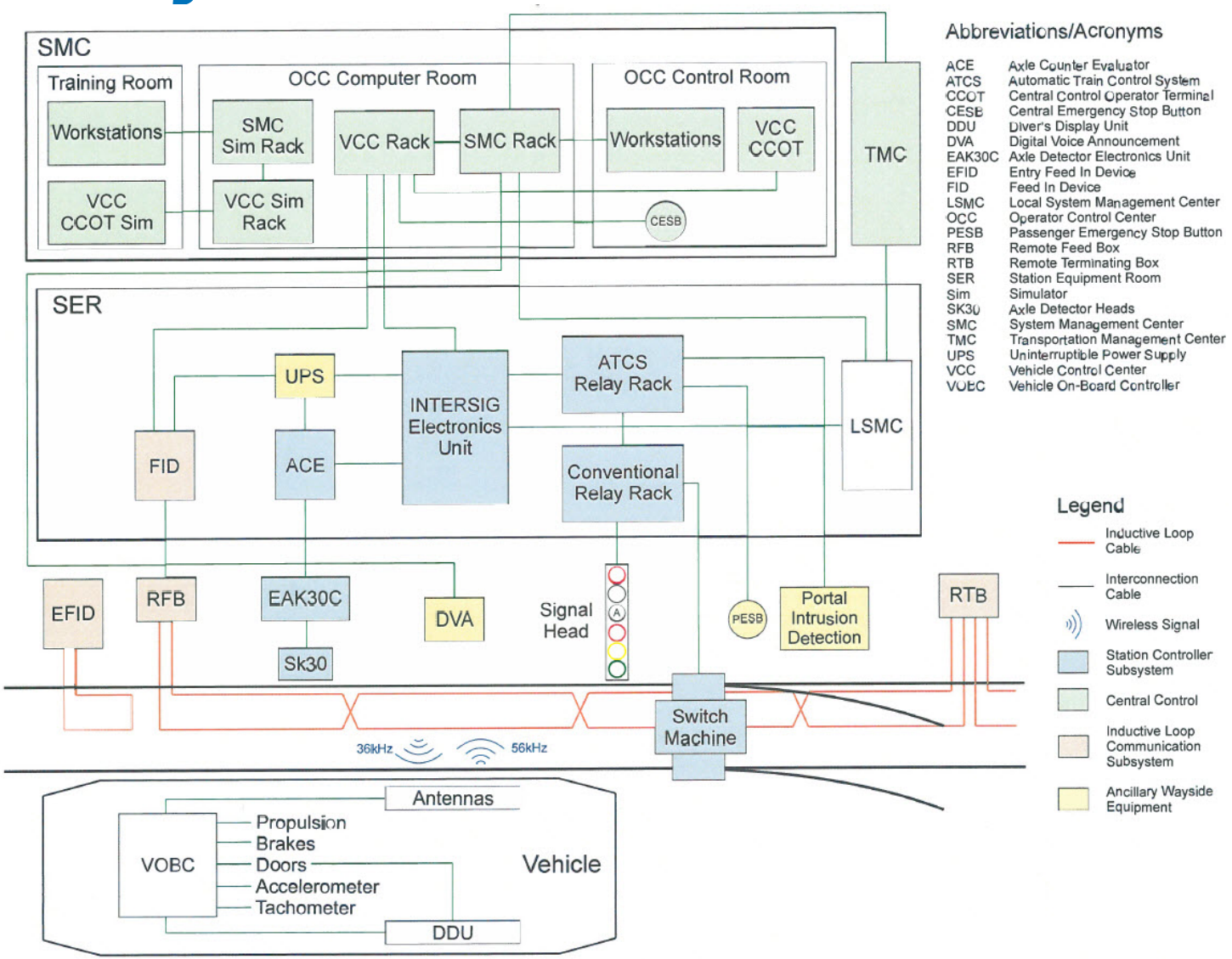
ATCS System Overview



SMC – System Management Center

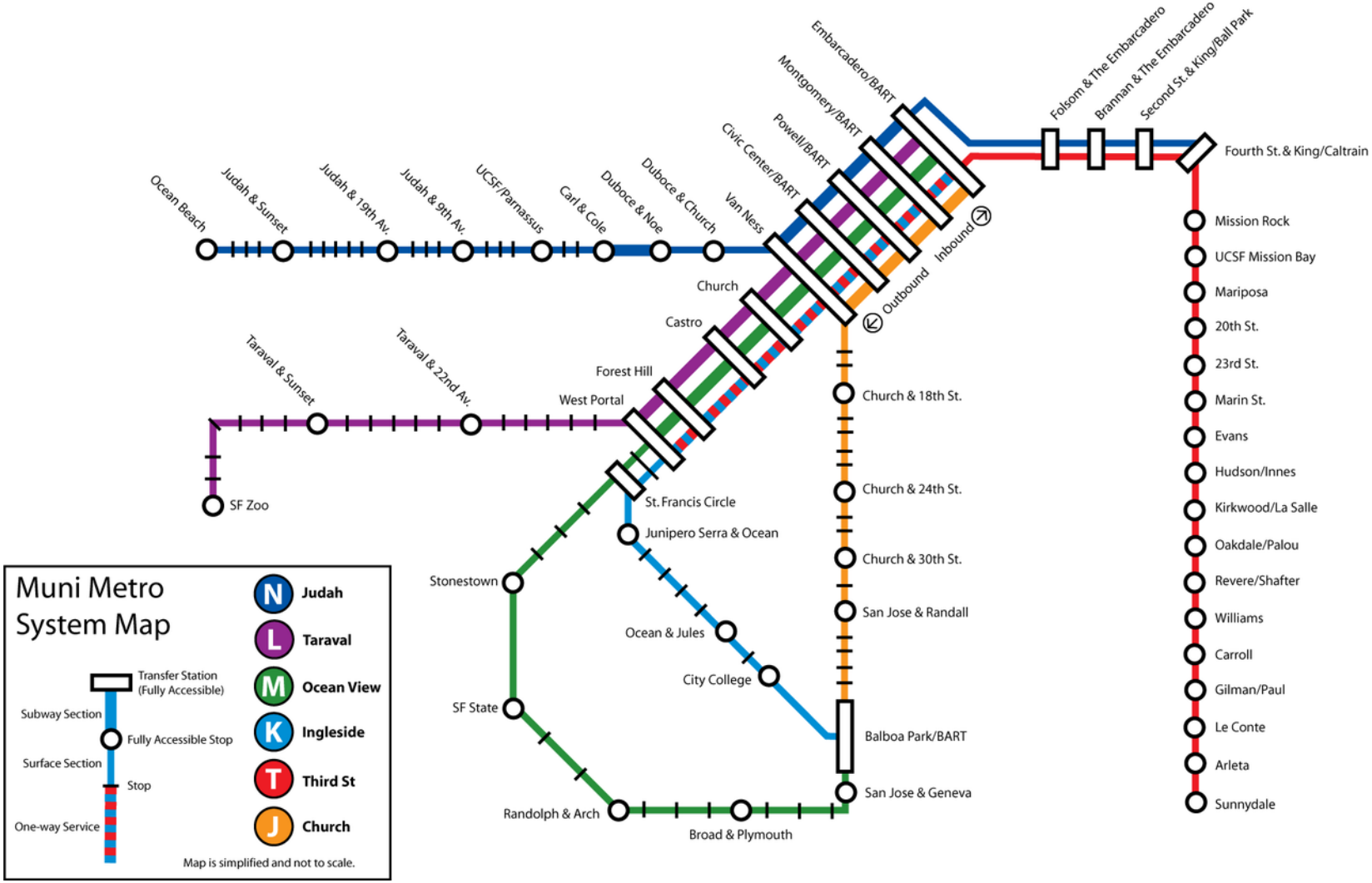


ATCS System Overview

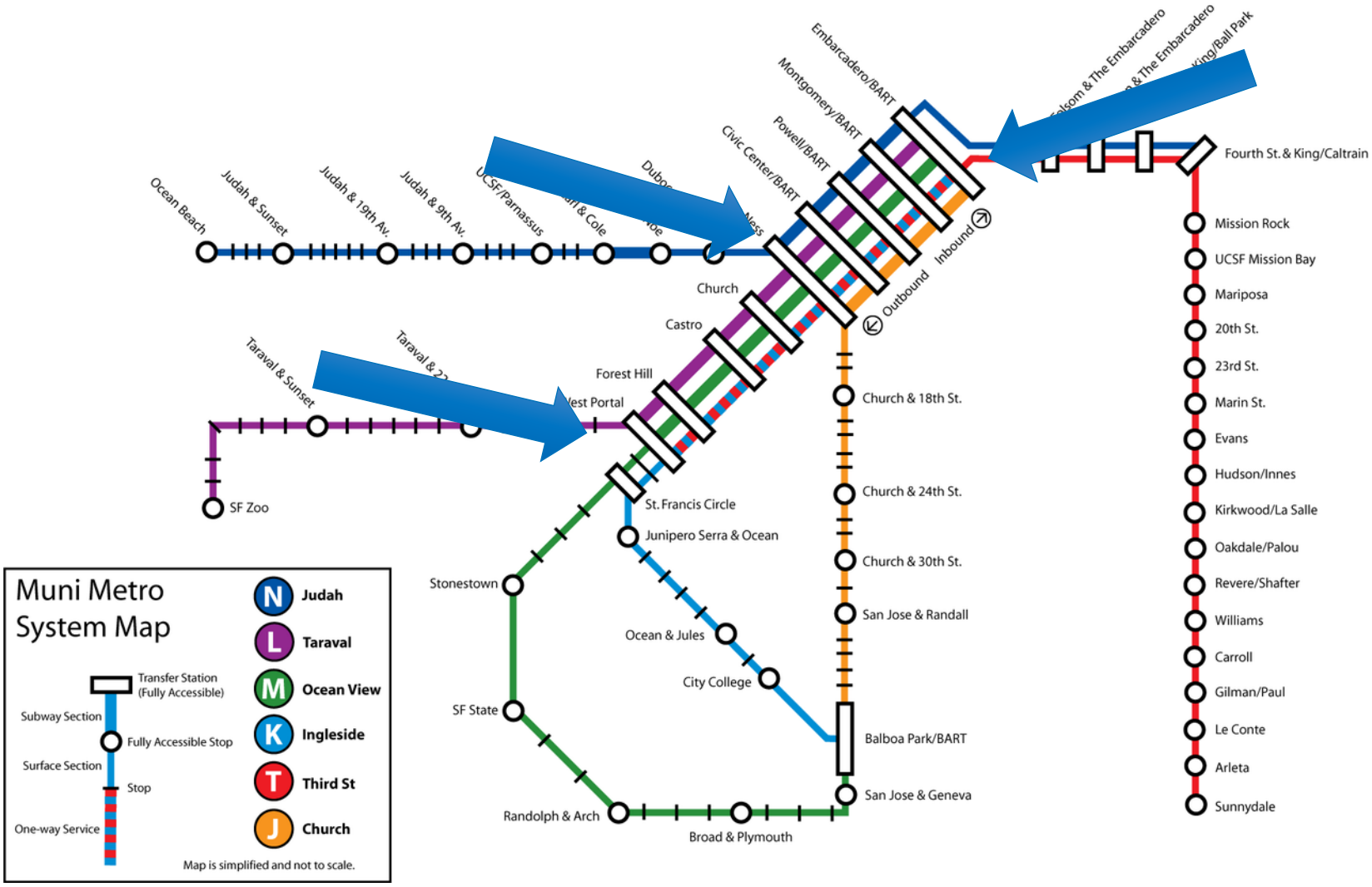


Current Challenges

Geography


Muni Metro System Map
Transfer Station (Fully Accessible)
Subway Section
Fully Accessible Stop
Surface Section
Stop
One-way Service
Map is simplified and not to scale.
N Judah
L Taraval
M Ocean View
K Ingleside
T Third St
J Church
Ocean Beach
Judah & Sunset
Judah & 19th Av.
Judah & 9th Av.
UCSF/Parnassus
Carl & Cole
Duboce & Noe
Duboce & Church
Van Ness
Civic Center/BART
Powell/BART
Montgomery/BART
Embarcadero/BART
Folsom & The Embarcadero
Brannan & The Embarcadero
Second St. & King/Ball Park
Fourth St. & King/Caltrain
Inbound
Outbound
Mission Rock
UCSF Mission Bay
Mariposa
20th St.
23rd St.
Marin St.
Evans
Hudson/Innes
Kirkwood/La Salle
Oakdale/Palou
Revere/Shafter
Williams
Carroll
Gilman/Paul
Le Conte
Arleta
Sunnydale
Church
Castro
Forest Hill
West Portal
Taraval & Sunset
Taraval & 22nd Av.
SF Zoo
Church & 18th St.
Church & 24th St.
Church & 30th St.
San Jose & Randall
Balboa Park/BART
San Jose & Geneva
St. Francis Circle
Junipero Serra & Ocean
Stonestown
Ocean & Jules
City College
SF State
Randolph & Arch
Broad & Plymouth

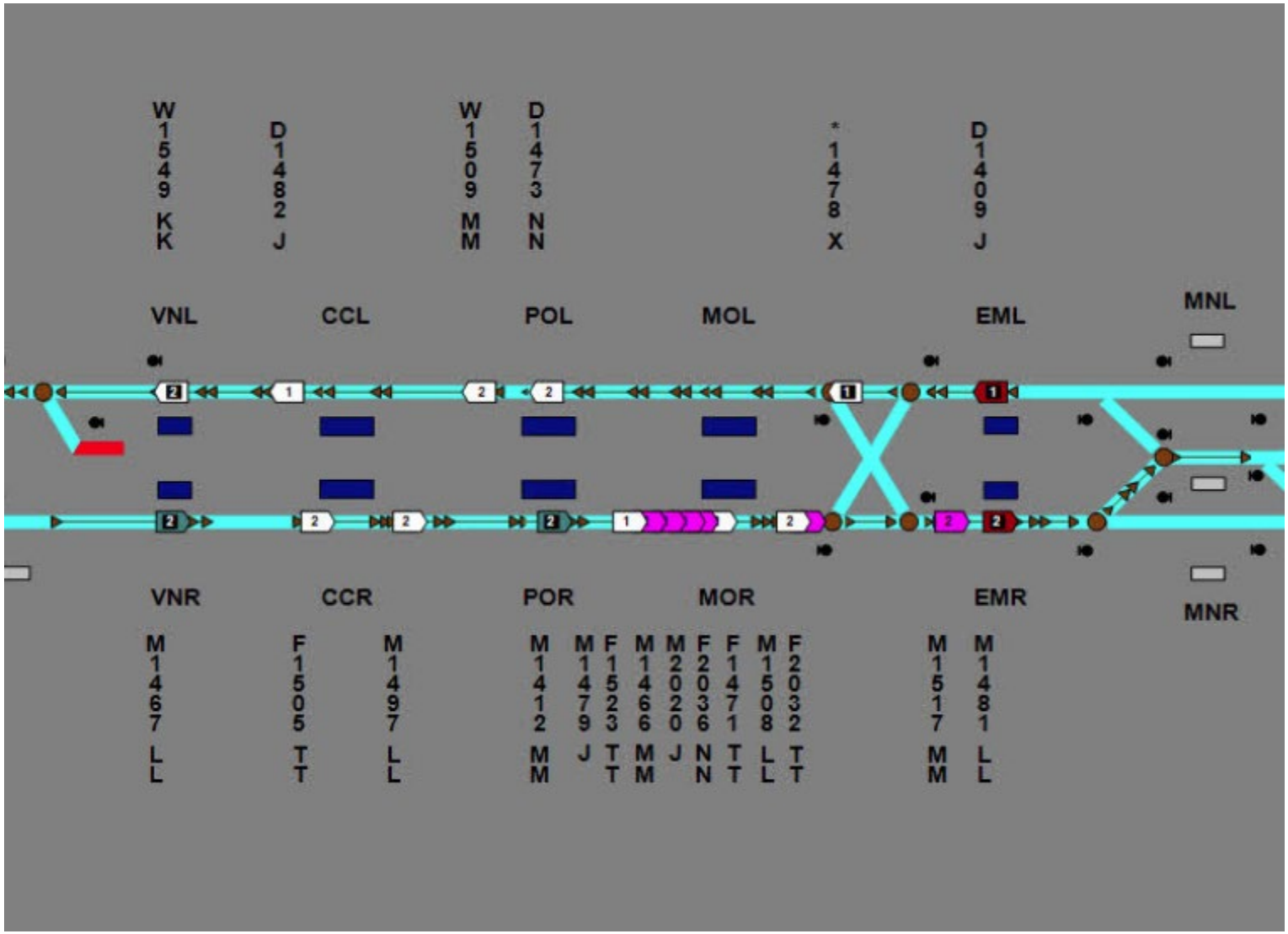
Portal Delays



Communication Issues

Breakdowns

Subway Congestion



System Failures

Surface Variability / Turnbacks

Roadmap for the Future

- Technology Upgrades
- System Expansion
- New Capabilities

Technology Upgrades

- Replace loop cable with wireless
- New onboard computers
- New central computers
- New axle counters / secondary detection

Would address:

System Failures

Portal Delays

Communication Issues

System Expansion

Expanding the system to the surface would eliminate some key geographic issues, specifically

Portal Delays: Reduced by the trains staying within the system

Communication Issues & Breakdowns: Reduced by the trains entering at yards, where issues can be addressed.

Subway Congestion, Surface Variability, and Turnbacks: Controllers would be able to 'see' trains in the entire system, allowing them better opportunity

Connection to Traffic Signals

New Capabilities

- In-cab signaling
- Coordination with traffic signals
- Enforcement of signal violations
- Automatic Fault Monitoring
- Adaptive headway management
- Reverse running and special events

SFMTA

Questions?