Los Angeles County Metropolitan Transportation Authority (Metro)

Advanced Transportation Management System (ATMS) Overview

June, 2010

Metro

ATMS is Supported at all Levels… It Takes a Village

CEO

Board Members

Division Managers

Operator

Security (LASD)

Transit Operations Supervisor

Maintenance Mechanics

Controller

and many others…

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Metro Bus Service Statistics

- Service Area (in sq. miles): 1,433

- No. of Lines / Routes: 191

- No. of Bus Stops (approx): 16,000

- Fleet Size (+/- 1%): 2,635

- Average Weekday Boardings: 1,184,729

Revenue Divisions 11

Advanced Transportation Management System (ATMS)
Concept of Operations

Metro

GPS SATELLITE

Bus Operations Control (BOC) Center

BOC

ORBCAD SYSTEM

DCC

DVR Database

TRANSIT DATABASE (Data Fusion)

OCI Training

MAP DATA

HASTUS SCHEDULE DATA

HR EMPLOYEE DATA

TOTS OPERATOR ASSIGNMENT DATA

M3 VEHICLE DATA & ROAD CALLS

LADOT BRT DISPLAY
ORANGE LINE VMS

511 TRAVELLER INFORMATION

RIITS

EMERGENCY DISPATCH CENTER (EDC)

INTERNET

PUBLIC ACCESS WEBSITE

VOICE TO BUS

VOICE TO BOC

ROVING MECHANICS (FET'S)

ROAD SUPERVISORS (VO'S)

ANTENNA SITES

Hauser Peak
Sunset Peak
Sierra Peak
San Pedro
Oat Mountain
Lukens   AON
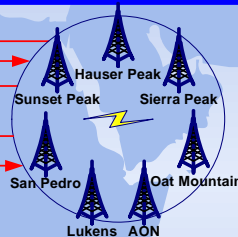
LONG BEACH TRANSIT
FOOTHILL TRANSIT
LAC PUBLIC WORKS
CALTRANS
LADOT
METRO RAIL

BUS SYSTEMS

2500+ Vehicles

MOTOROLA VOICE/DATA RADIO

UFS

DESTINATION SIGN

INTERIOR SIGN

CCTV VIDEO (3-8 Cameras / Bus)

DVR

AVA

APC
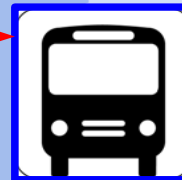
SmartMDT

CONTRACTED SERVICE FLEET 200+ VEHICLES

UFS WLAN

ATMS WLAN

DIVISION SYSTEMS

MAINTENANCE

TRANSPORTATION

UFS

DIS

Introducing Metro's Newest Vehicle
NABI, 45' Compo, 8100 Series, Full ATMS (260 vehicles)

Operator Log-On

SmartMDT

- Verifies operator badge and work assignment from TOTS, HASTUS and HRMS data

- Tracks schedule adherence by indicating how early, or late (Pull-out/In-service) from published schedule

- Transmits and Receives text messages

- Sends work assignment and fare set data to UFS

- Provides bus tracking in an emergency

- Calls for assistance in an emergency (SAS)

- Allows controllers to listen on what's happening inside the bus in an emergency (covert

- Operator enters Badge Number
- ATMS / UFS - Single Log-On Feature

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Smart MDT Upgrade

Current
SmartMDT

New
OrbGuide

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At BOC, Bus Controllers …

- Monitor bus movement in real-time

- Communicate with Operators by voice or text

- Hear conditions in the bus in an emergency

- Monitor schedule adherence (early, late, on-time)

- Have access to passenger load information

- Knows who is driving the vehicle

Satellite Tracks Buses with GPS

What is AVL?

Real-Time Map Display

Bus has GPS (Global Positioning System) Antennae

Controller's Workstation with three monitors
• Automatic Vehicle Location (AVL)
• Monitor Performance & Incident Queues
• Quick Dial Telephone System

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Fleet Supervision (TOS)

- Monitors bus operation in field via mobile unit.

- Responds to emergencies

- Assists operators with problems

- Communicates by voice and text to operator

- Provides on-sight information to Controller

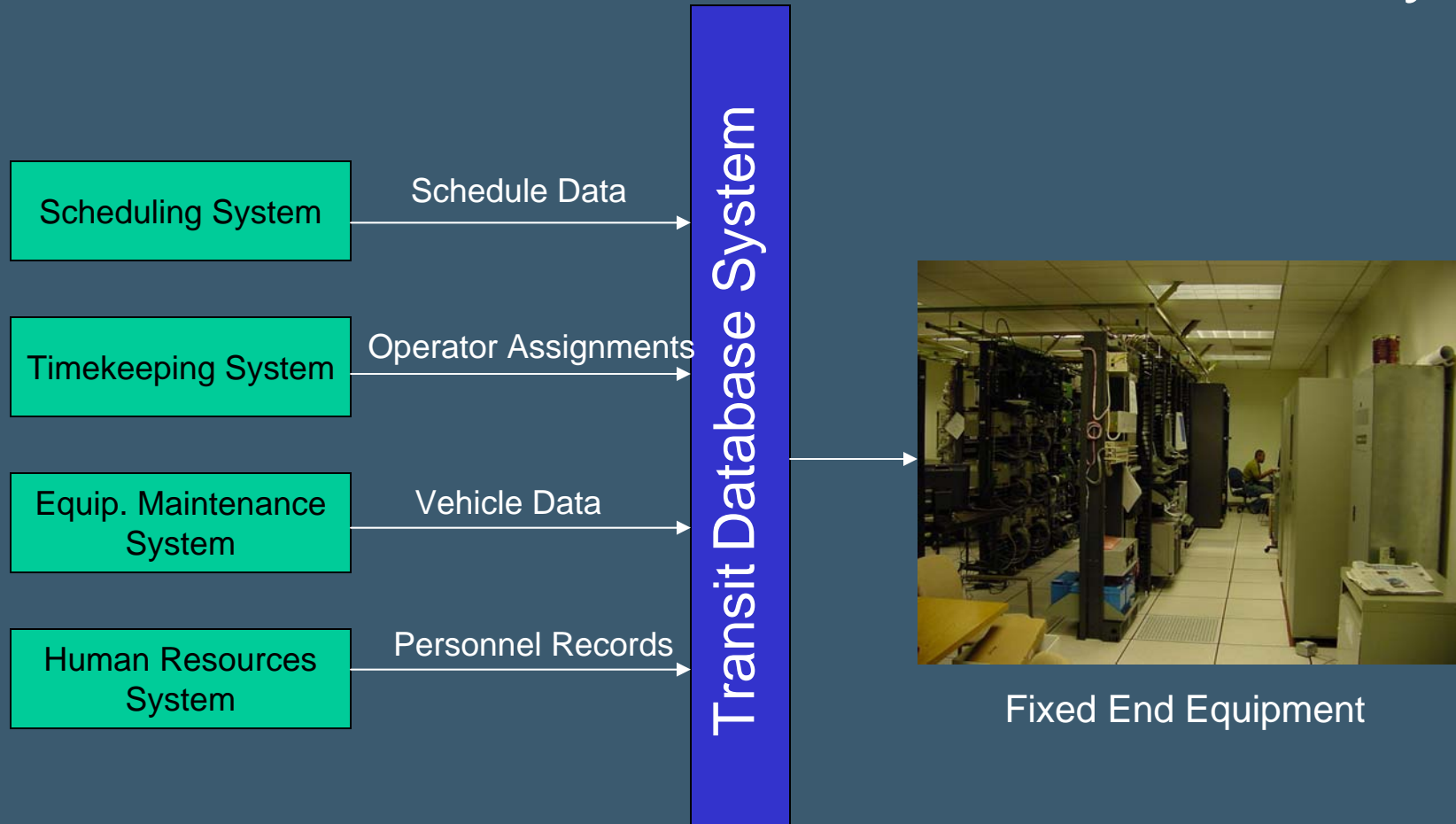- TOS collects accident data for direct feed to TransitSAFE

Roving Mechanics…

- Find incident locations quickly with GPS
- Help operators faster with voice/data radios
- Fix problems (road calls) on the spot
- Get assistance quickly when needed

Schedule Data Process

- ## Collects information for the next transit day

Scheduling System	Schedule Data →	
Timekeeping System	Operator Assignments →	
Equip. Maintenance System	Vehicle Data →	Transit Database System
Human Resources System	Personnel Records →	

Fixed End Equipment

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Automatic Voice Annunciation (AVA)

Internal Announcement: Stop Requested by Patron

🔊 "Stop Requested. Please Use Rear Exit."

Internal Announcement: "On Street and At Street"

After Stop Requested; "On Street and At Street"

🔊 "Approaching Sunset and Figueroa"

External Announcement: Line/Destination

🔊 "Line 740: Downtown L.A. Union Station"

Metro AVA Policy: Announce All Int/Ext Stops 24/7

Automatic Passenger Counters (APC)

- Metro's On-Time-Performance is based on synthesized APC data;

- APC hardware is robust (IRIS);

- APC Version – IRMA-3. New fleet being installed with IRMA-4

- Configuration Management is an issue – different analyzer software for different vehicle type.
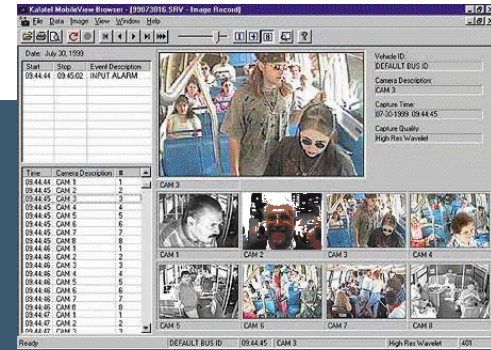
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Data Latency

- AVA Download – About 1 week to download to entire fleet (10-20 veh/hr – available 1-2 hrs/day @ Div)

- APC Download – About 3 days to download a complete days worth of fleet data ;

- Schedule – Semi-annual Shake-ups

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Video Surveillance

Bus Fleet

Control Center

Video Surveillance Initiatives

1. Improve DVR download process;
2. Agency wide Video Policy
3. SmartDrive Implementation
4. DVR Data Warehouse;
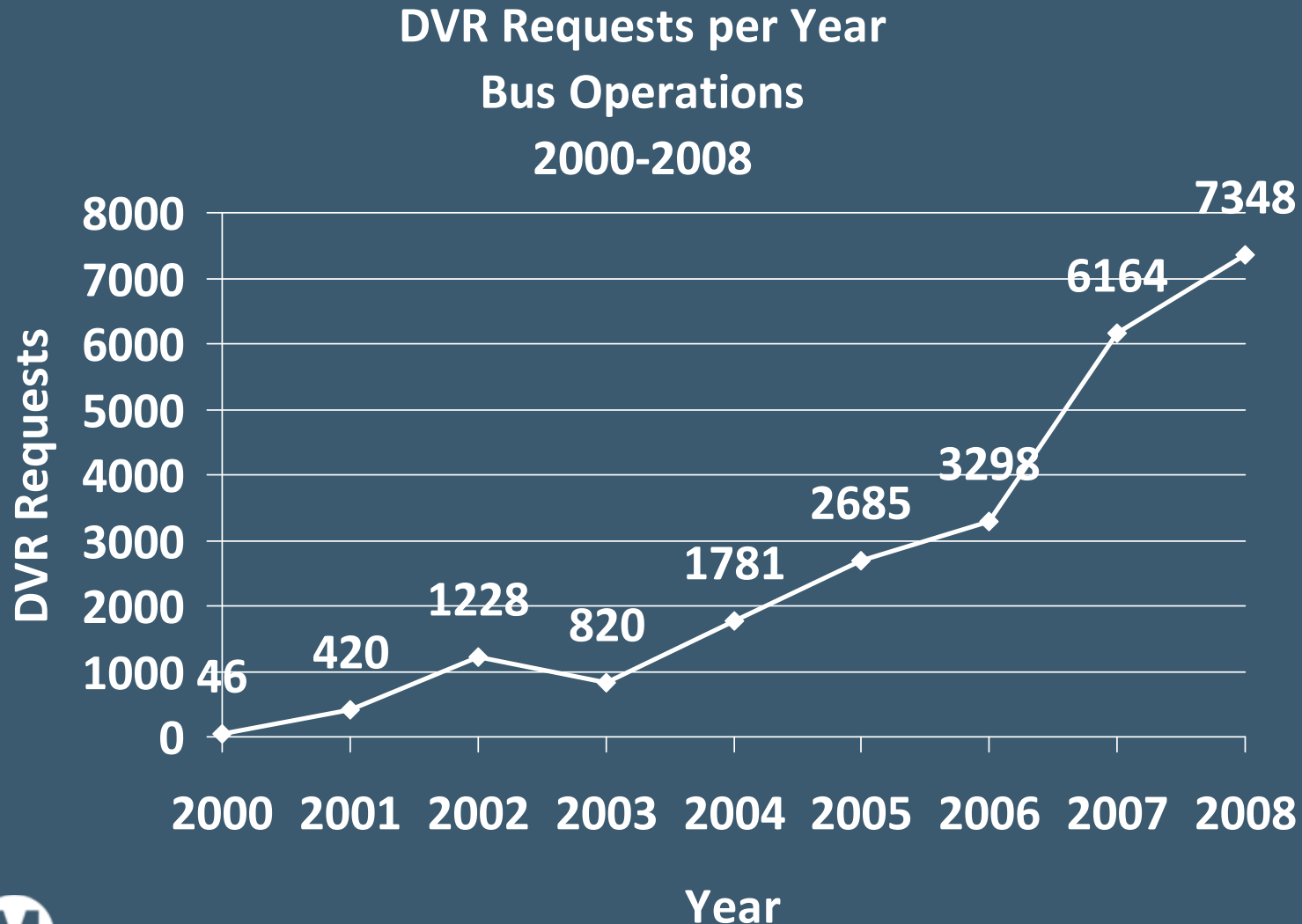5. Expand Video Access

Field Supervisors

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Video Surveillance (CCTV's & DVR's)

- 3-10 CCTV's/bus (depends on vehicle type);

- DVR-2, DVR-3, installed (labor intensive download).

- SmartDrive – Front/Rear Facing Video (contracted video validation) – complete by Dec-2010.

- Remote Video - 1-minute remotely activated video clip from BOC with auto WLAN download; nice, but not very useful.

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DVR Trend is Increasing Rapidly

DVR Requests per Year
Bus Operations
2000-2008

Y-axis: DVR Requests (0 to 8000)
X-axis: Year (2000–2008)

Data points:
- 2000: 46
- 2001: 420
- 2002: 1228
- 2003: 820
- 2004: 1781
- 2005: 2685
- 2006: 3298
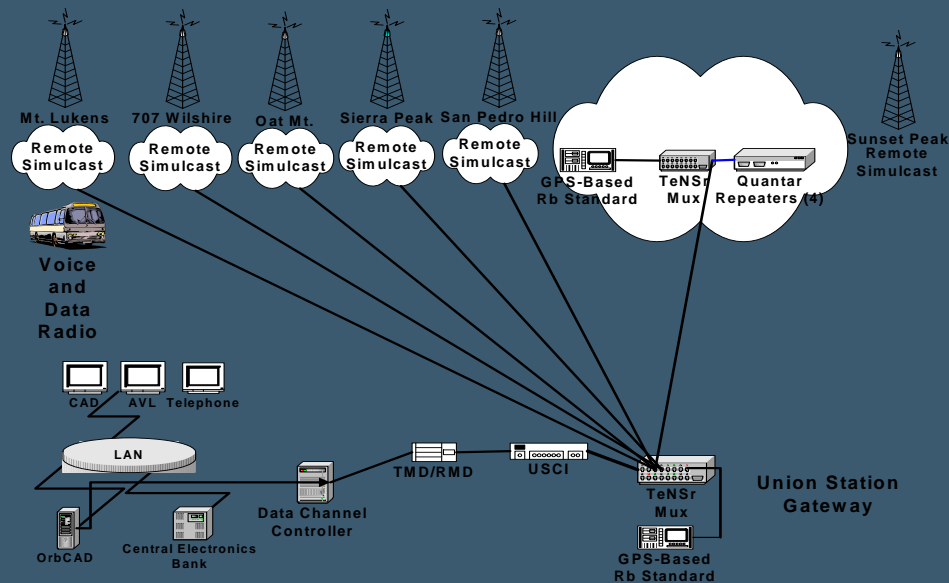- 2007: 6164
- 2008: 7348

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Metro Owned/Operated RF System (Voice and Data)

Voice: 19-channels; 900MHz

Data: 5-channels; 508 MHz (2 additional channels – In development

Poll Rate: 5 minute polling; 3 minute (pending 2-channel integration)
                Plus updates at every timepoint (3 minute avg. updates fleetwi

Mode: Trunked Simulcast

Antenna Sites (7 Base Stations in LA County)

ATMS Reports

- Data is transmitted to the TDB for management query and reporting;

- Standard reports are available (daily) via secure accessed share driv
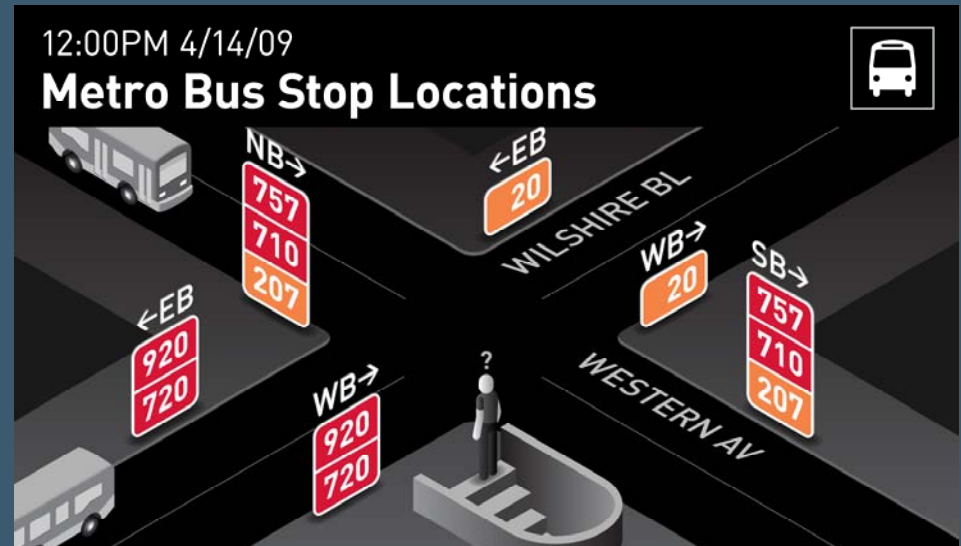
- Web server report/querying (ad-hoc) – In development.

AVL - Route Traces

Management Reports in Various Formats

Bus Arrival Information System
Rail-to-Bus Connection Information

Orange Line VMS

Metro ATMS Continues to Develop….

- Next Bus Arrival Time / Rail-to-Bus Connection Info
- Windows-7 / Xp CAD Upgrade
- FCC Narrowband Frequency Mandate - 2013
- Headway Management for BRT
- Countywide Signal Priority Interface
- 511 Traveler Information Expansion
- Orange Line Extension
- Google Transit
- Ad-Hoc Schedule Updates (Between Shake-up Updates)
- TOAST – Hastus Daily will incorporate TOTS
- Integration of Contract Service Fleet
- Poll Rate Update (5-min to 3-min)

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