IHEEP 2009

Wireless Fleet Management

John Moscatelli
AT&T - Transportation Industry Solutions

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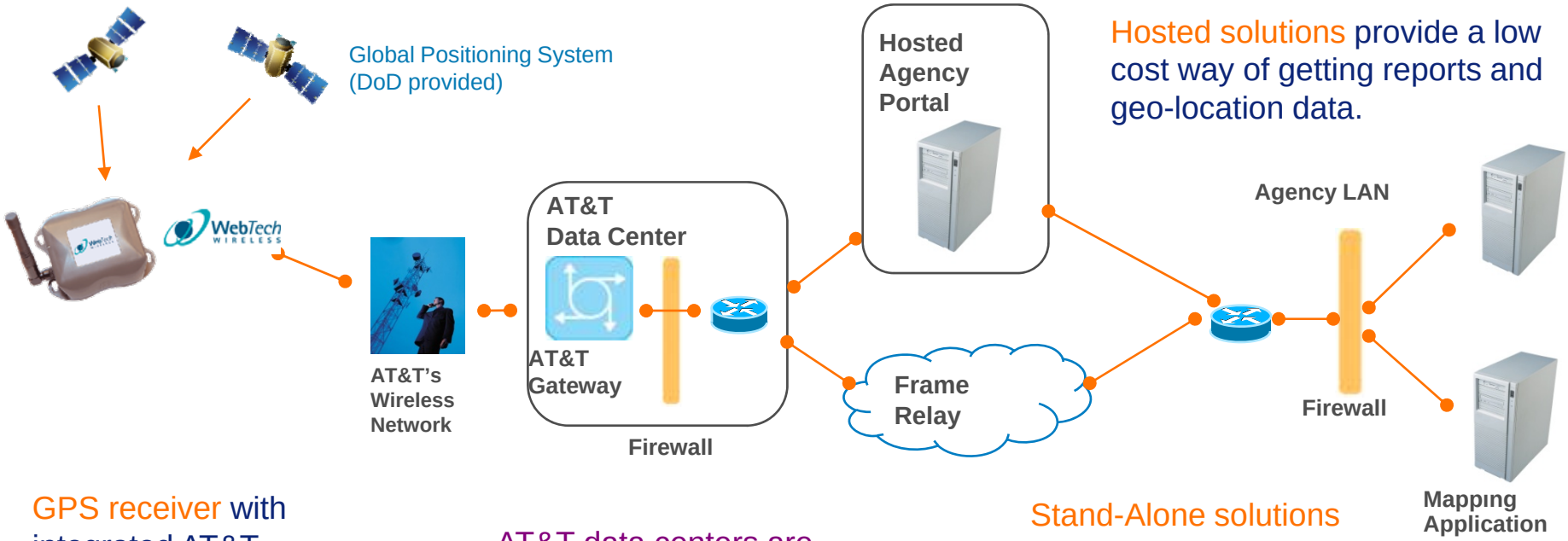
Industry Concerns and Trends

- Legislating vehicle idle time (environmental concerns, energy conservation) – 3 minutes in some states.
- Regulations regarding hands-free cellular – 5 states to date
- Increasing fuel costs $4.14 gal national average on 8/26/08
- Handheld devices are more robust and costs have declined, e.g. MC35, CN3. Asking drivers to do more outside the cab with a self sufficient hand held or as part of a converged hot spot solution
- Risk aversion – speeding, unauthorized use, predictive analysis, etc.
- Automating real time “any paper process”….can improve accuracy, billing efficiencies, and eliminates administrative expense

Fleet Management Hosted Solutions

Best practices are to use a hosted solution for providing mapping, reporting and other applications that can be custom tailored to an agency's needs on a managed services basis. Low cost integrated GPS receivers with wireless modems operate on AT&T's data network providing positioning updates as often as every few seconds. For larger or highly custom applications, AT&T also supports stand alone fleet management solutions.



Hosted solutions provide a low cost way of getting reports and geo-location data.

GPS receiver with integrated AT&T Broadband Connect Radio

AT&T data centers are secured facilities with 24/7 monitoring

Stand-Alone solutions have direct connection to AT&T network to receive GPS data.

Challenges For Fleet Managers

Operating Expenses

- Rising fuel and labor expenses are driving per hour vehicle expenses to record levels with no end in sight.

Transparency

- Citizens are demanding higher service levels from their local municipal agencies. They want agencies to be accountable for the services they provide and have the tools and systems to inspect their service levels.

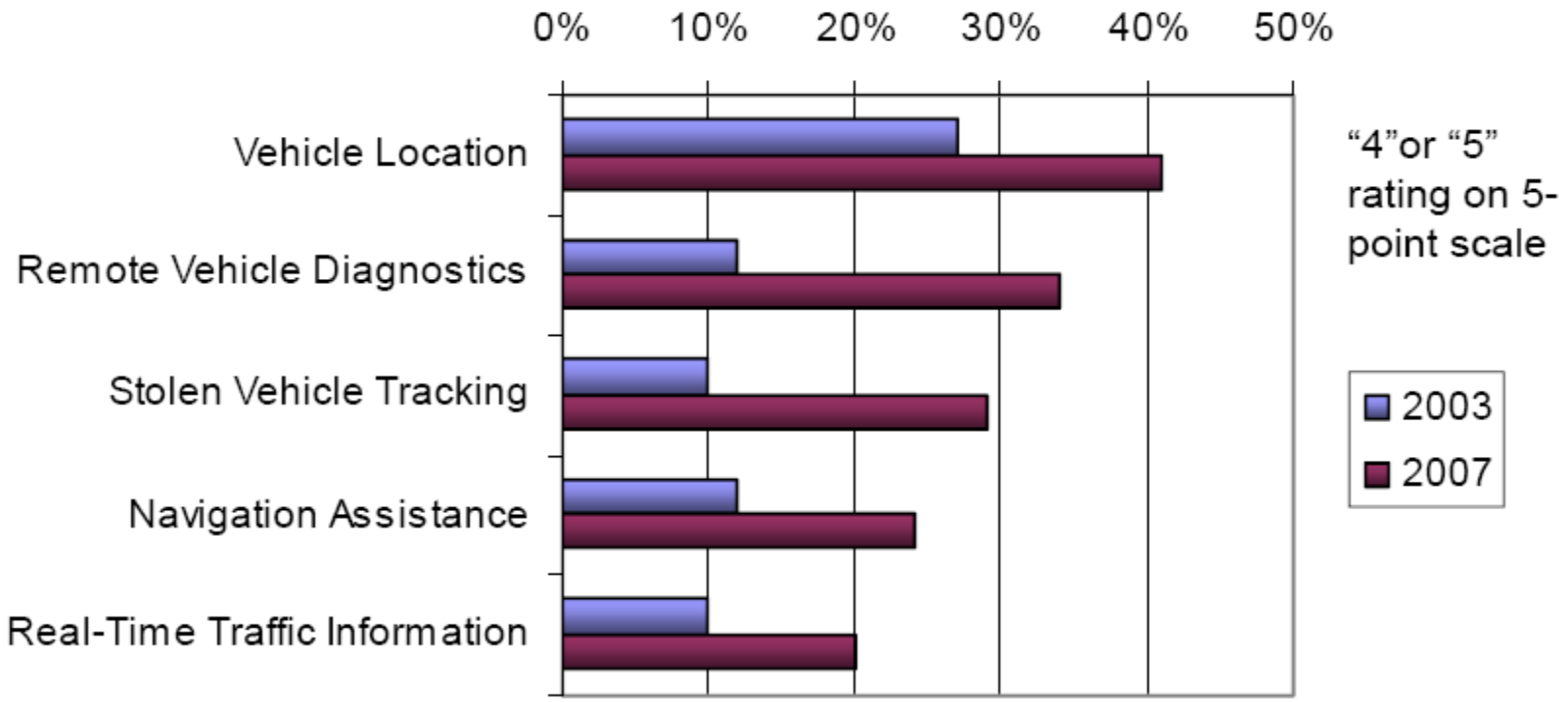
Reduced Budgets

- As Agencies look at flat or tightening operating budgets, they need to improve productivity of existing resources and make work processes even more efficient.

Limited Capital

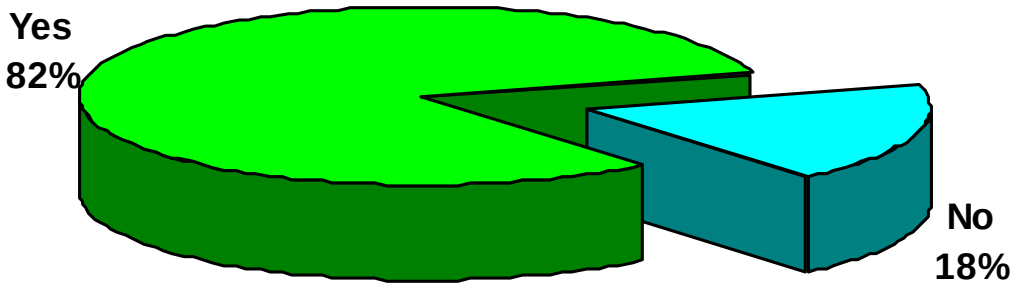
- Major system improvements or software upgrades may be delayed or eliminated due to limited capital budgets. Need hosted service that can provide solution on a per user, per month basis.

Telematics Adoption Trends



CJ Driscoll, comparison of 2003 and 2007 fleet surveys

More Fuel Efficient Vehicles / Technologies

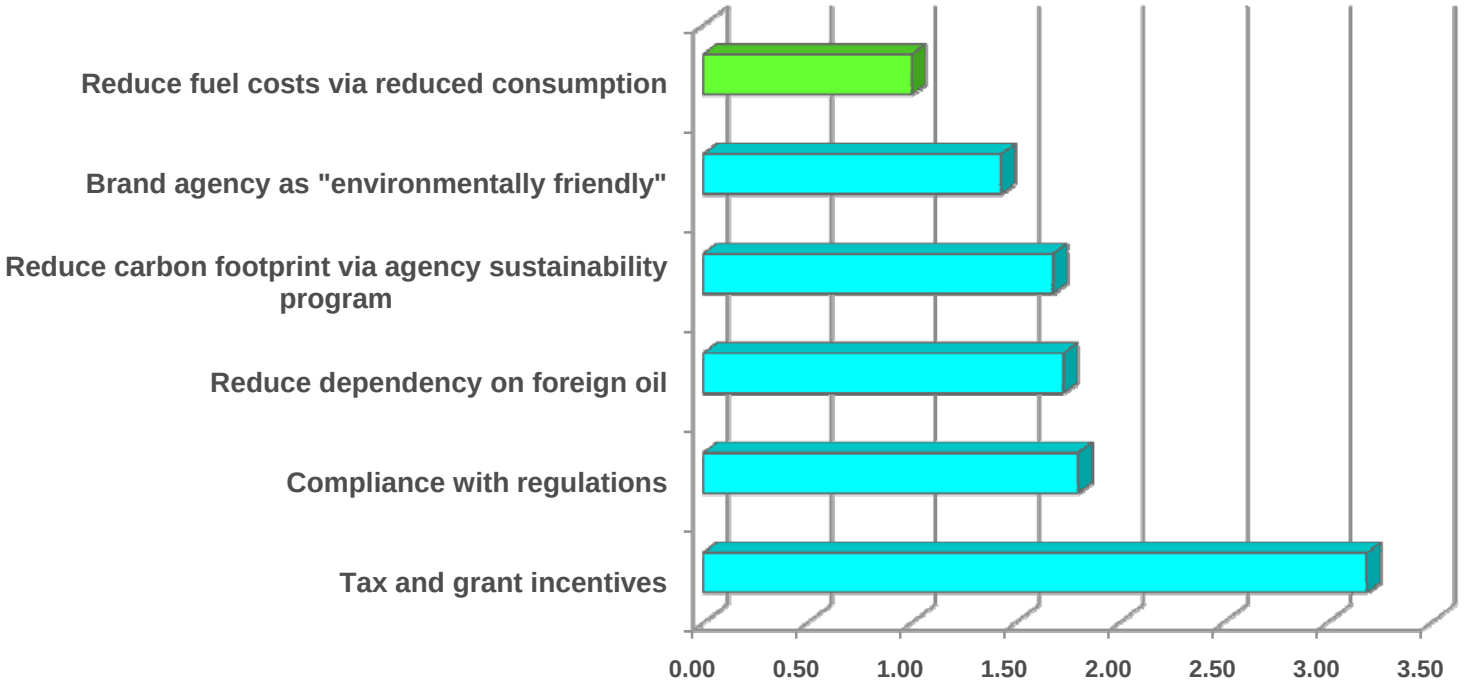


82% of government agencies are currently looking to transition a portion of their fleet to more fuel efficient vehicles or technologies

Source: Bobit Business Media Research Services, 2008
626 survey responses: 310 Government Agencies and 316 Commercial Agencies
(Data shown for government agencies only)

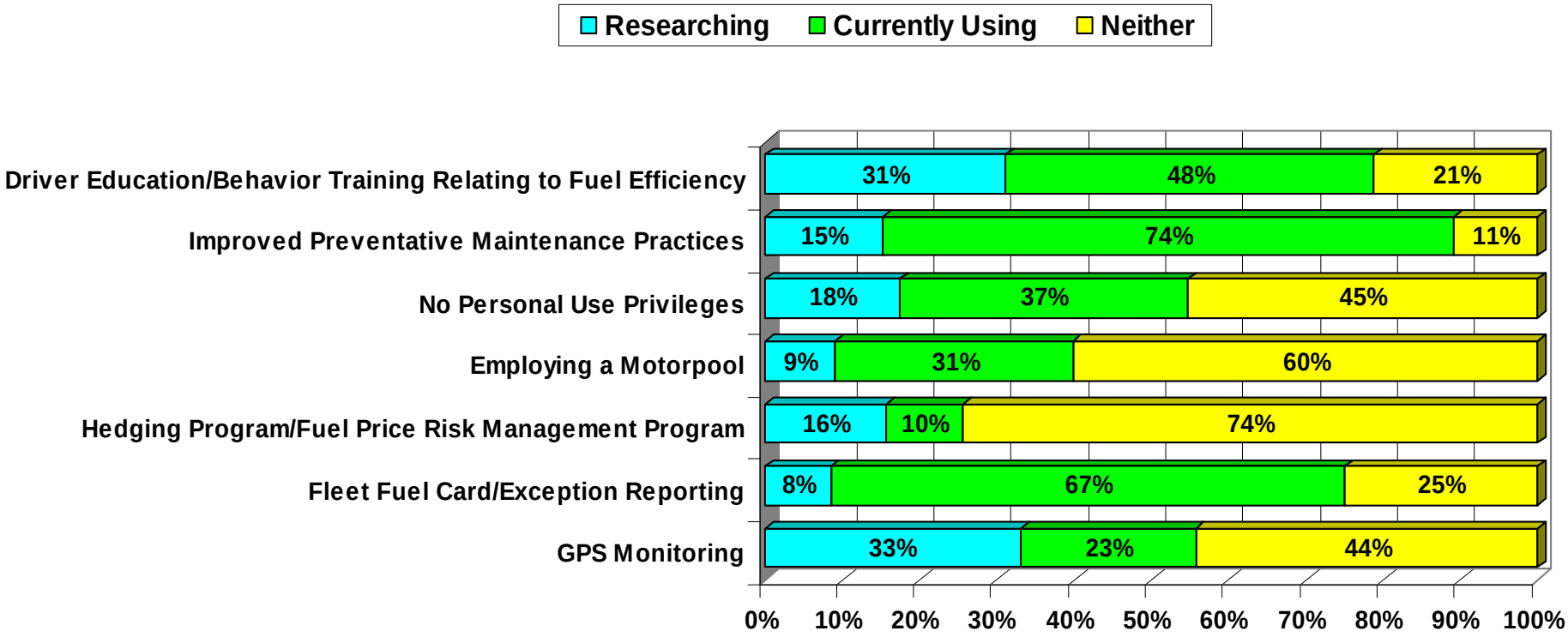
More Fuel Efficient Vehicles / Technologies

Ratings: 1 = most influential; 6 = least influential



Source: Bobit Business Media Research Services, 2008

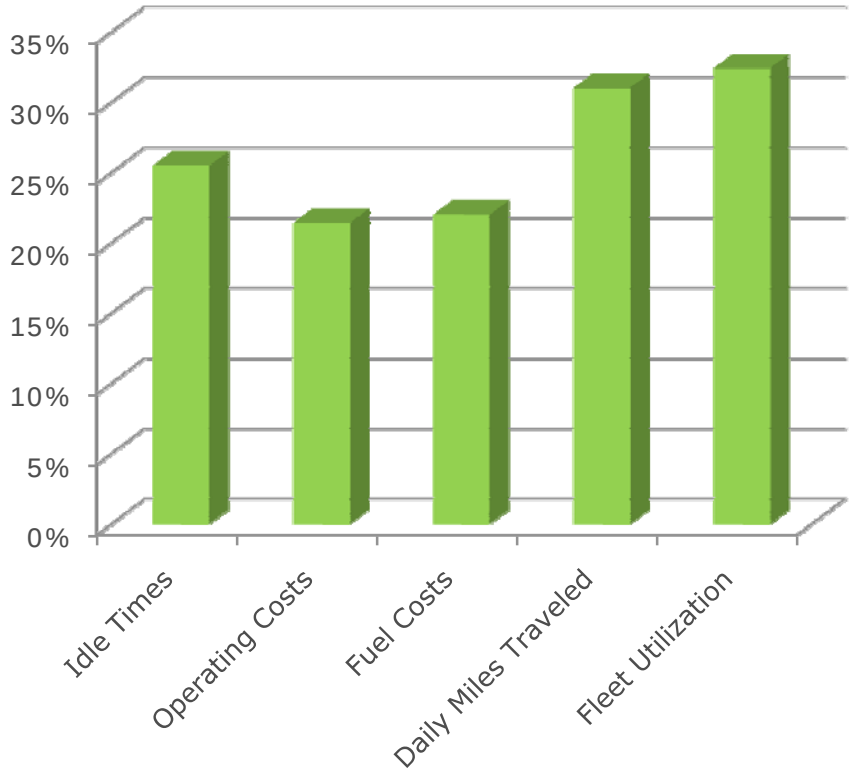
Methods to Reduce Fuel Spend



Source: Bobit Business Media Research Services, 2008

Gov't & Service Fleets: Average Savings

Mean % Improvement Since Adoption of Location-Based Fleet Management System



Source: Aberdeen Group, 2009
(survey of 200 service professionals)

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WebTech WIRELESS

Backup Satellite Commun. Option

Wi-Fi Commun. Option

Remote Monitoring Telemetry Including Broom Up/Down, Spray On/Off, Boom or Lift Deployed, Hour Meter, Door Open, A/C On, Light On, etc.

Remote Control Telemetry Including Starter Disable, Door Unlock, etc.

Custom Canned Text Messages Including Location; also Free-Form Messages

Vehicle Maintenance Management

GPS Tracking with Flexible Update Rates & GSM/GPRS EDGE Cellular Commun.

Driver Logs (HOS)

In-Cab Hands-Free Voice Commun.

PDA Commun. Modem

Tractor & Trailer Matching & Tracking

In-Cab Internet & Bluetooth Connectivity For Laptops and PDAs

Untethered Trailer Tracking

Integration with Back-End Applications

Landmark and Geofence Boundary Crossing and Duration Reporting, including Real-Time Email or SMS Text Messages on Crossings

Multi-Stop Route Planning, Including Visual Comparison to Actual Route

Find Nearest Vehicle Including Best Suggested Route, for Unplanned Stops

Engine Reporting Including Fuel Used, MPG, Idle Time, RPM, Engine Diagnostics, etc.

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"Real-Time" GPS Tracking and Monitoring

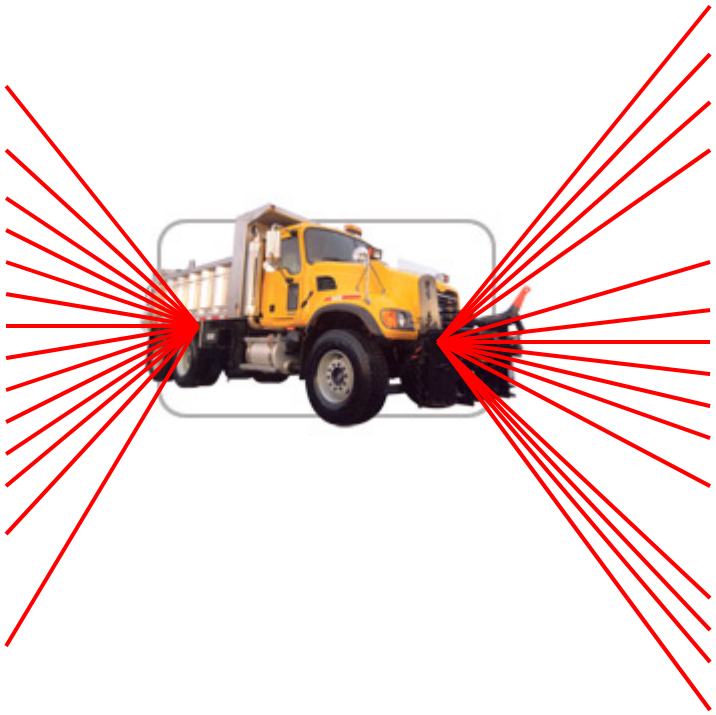
Vans, Trucks, Tractors, Tankers…
Wireless, Satellite (dual-mode) and WiFi (802.11b/g)

Telemetry-Sensor Monitoring (partial list):

Remotely lock - unlocked doors
Pumps on - pumps off
Door open - door closed
Head lights on / off
Disable starter
Brake and reverse lights
Turn signals
Audible alarms
Power take off (PTO)
Engine temperature
GPS-MDT disconnected
Cargo and load sensors
Tire sensors
and much more…

Quadrant Mapping

MapPoint, deCarta, Google



In-Vehicle Hardware

Mobile Data Terminal (MDT)
Ruggedized Tablet MDT
Laptop
Ruggedized handheld
Bar code scanner
Magnetic card reader…

In-Vehicle Communications

Bluetooth adaptor
Internet and VPN access
Email and Messaging
Voice services
Electronic forms
In-cab navigation
Signature capture…

In-Vehicle Safety and Security

Driver ID kit
Disable Starter kit
Panic buttons
SafetyCheck…

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50+ Fleet Management Reports (partial list):

Driver centric reports:

- Driver Report Card
- Driver Status
- Driver Performance
- Driver Time Sheets
- Driver Activity Summary

- Idling by Driver
- Idling Group Summary
- CO2 Emissions
- Trailer Usage
- Trailer Usage Summary
- Landmark In/Out
- Landmark Drive Time
- Geofence In/Out
- Vehicle-Fleet Status
- Telemetry
- IFTA Fuel Tax Reporting
- ODB2 - JBUS
- JBUS Fault Logs
- Driver Logs
- Hours of Service Summary

Report scheduler

Back Office Applications Integration

Routing / Scheduling, Dispatch, Accounting…

OBD2- JBUS Vehicle Performance

- Power Train
- Engine diagnostics

JBUS Vehicle Performance Reporting:

- Miles traveled
- Fuel usage
- Fuel economy
- Average speed
- Engine hours
- % moving
- Over RPM
- Excess speed
- Over idling
- Hard Breaking
- Sharp Acceleration
- CO2 Emission

Maintenance Scheduling

Diagnostics and Fleet Scorecards

Costs: You Can Only Manage What You Measure

Driving Analysis and Training

- Idling Reductions
- Speeding
- Sharp Acceleration and Harsh Braking
- Over-revving

Vehicle Compliance, Maintenance, Remote Smog Checks

- Monitor trouble codes, emissions control system, reduce wear and tear

Going Green: CO2 Reductions and Offsets

Fleet Utilization and Emergency Response

- Maximize # of trips/vehicle and services/trip; minimize cost/trip
- Method: analyze and re-sequence routes, re-assign deliveries, reduce vehicles or miles

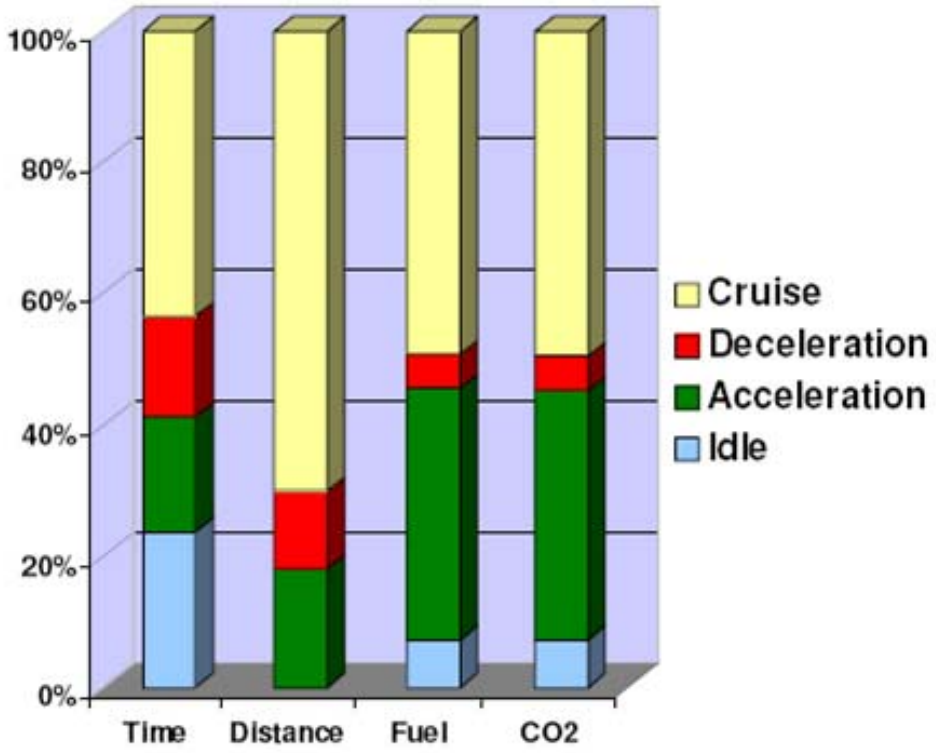
Personnel Management, Productivity, Paperwork Reductions

Insurance Cost Savings

Driving Analysis and Training

- Fleets can save 5% to 20% on fuel usage with driver training programs
- Jackrabbit starts increase fuel used, cause excessive engine wear
- Better shifting (not at max RPM) can reduce fuel use by 8%

Driving Modes for Sample Commuting Trip



Idling Reductions

Idling for >10 sec uses more fuel than restarting the engine

Diesel:1 gal/hr, Gas: ½ gal/hr

Idling reduces oil life by 75%

Idling Summary Report

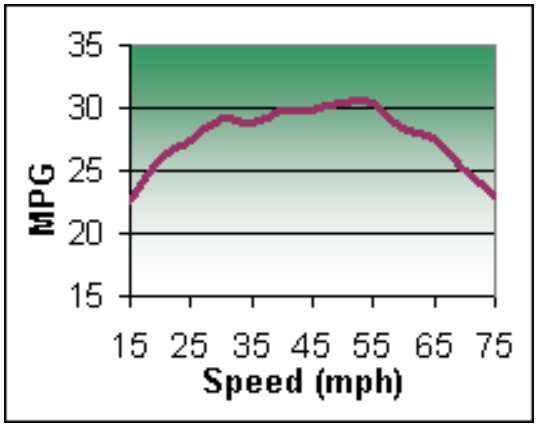
Company:	T				
From:	Mar. 05 2007 00:00:00	To:	Mar. 11 2007 00:59:00	Time zone:	PST
Idle Time Filter:	10 min	Order by:	Vehicle (Ascending order)		
Description:	Shows idle time summary information			Date Printed:	2008/09/10
Note:	Idle time is all non-travel time recorded between an ignition on and an ignition off				
	Idle time filter is the minimum idle time duration included in the column total				
	Total operating time is the total time recorded between an ignition on and an ignition off				
	Percentage idle time is idle time over total operating time				

Vehicle	Total Idle Time - No Filter (hh:mm:ss)	Total Idle Time - With Filter (hh:mm:ss)	Number Idle Occurrences > Filter Time	Average Idle Time - No Filter (hh:mm:ss)	Average Idle Time - With Filter (hh:mm:ss)	Total Operating Time (hh:mm:ss)	Idling % of Total Operating Time
1	17:32:31	15:44:55	27	00:14:02	00:34:59	1 day, 04:42:26	54.86
1	20:48:04	17:52:38	32	00:12:28	00:33:31	1 day, 09:33:39	53.27
1	16:58:32	14:28:51	18	00:13:57	00:48:16	1 day, 03:07:49	53.38
							20.62
							50.78
							48.66

Date	Address	Idle Time (hh:mm:ss)	Idling % of Total Operating Time
2007/03/07 07:59:27	**Br.06, Richmond** 6840 No 9 Rd, RICHMOND, BC	00:13:42	.80
2007/03/07 08:22:31	**Lafarge, Richmond** 7492 Nelson Rd, RICHMOND, BC	00:14:15	.83
2007/03/07 08:55:24	**Lafarge, Richmond** 7510 Nelson Rd, RICHMOND, BC	00:32:01	1.86

Speed Reductions

- Save fuel by limiting speeds
  - For every 5 mph over 55, 6-8% reduction in MPG
- At least 5% fuel wasted
  - Assumptions: 60% of VMT is major routes, 75% drivers speed, 10% fuel wasted @ avg 20% above speed limit or 10 mph
- High speeds reduce tire life
- Lower speeds are safer



Speeding Duration Report

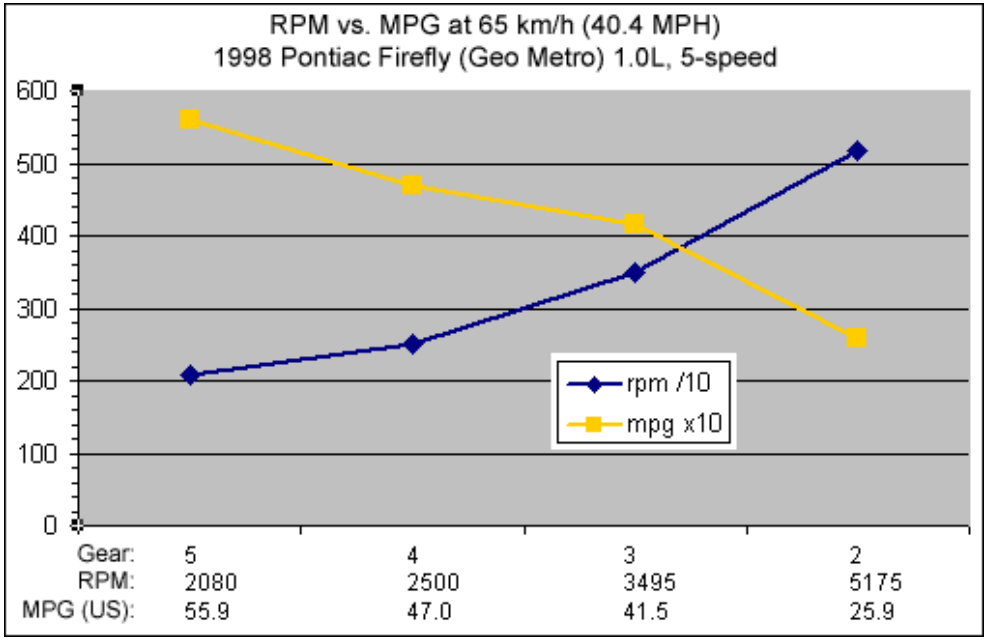
Company	ABC Trucking		
From	Jan 07, 2008 12:10:00	**To**	Jan 08, 2008 13:10:00
Description	This report displays vehicle speed exceeding report specified speed.	**Printed**	01/08/2008

Vehicle Name Smith-123

Speeding location	Start time	End time	Duration (hh:mm:ss)	Max Speed (mi/hr)	Distance (mi)
Trans Canada Hwy [HWY-1] SURREY, E	2008-01-07 17:37:59	2008-01-07 17:38:31	00:00:32	66.00	0.6
Trans Canada Hwy [HWY-1] COQUITLA	2008-01-08 07:46:26	2008-01-08 07:46:29	00:00:03	66.00	0.1
Vehicle Summary			00:00:35	66.00	0.6

Sharp Acceleration, Jackrabbit Starts

- Aggressive driving can lower MPG by as much as 33% at highway speeds and 5% around town (US DOE)
- In one study: jackrabbit starts reduced travel time by only 4 % but increased total fuel consumed by 37 % (Natural Resources Canada)
- MPG decreases with higher-than-optimal RPMs



Source: MetroMPG.com, 2009

Driving Analysis and Training

- Encourages more fuel efficient and safer driving practices and reduced CO2 emissions

Vehicle Performance Report (OBDII/J1979)

Company:	WebTech Wireless Inc				
From:	Feb. 16 2009 15:40:00	**To:**	Mar. 13 2009 15:40:00	**Duration:**	24 days, 23:00:00 **UofM:** Metric
Description:	The report displays vehicle performance based on OBDII diagnostics reporting			**Date Printed:**	Mar. 19 2009 14:45:35
Note:	Engine is engine run time; percentage compares engine run time with the analysis period				
	Moving is the time spent with a speed greater than 0; percentage compares moving time over engine time				
	Idle is the time spent with engine on and a speed equal to 0; percentage compares idle time over engine time				
	DTC is the number of engine Diagnostic Trouble Codes (DTCs) present (if any)				

Vehicle	IMEI / VIN	Distance (km)	Fuel usage (l)	Fuel economy (l/100 km)	Brake Count	Sharp Acceleration	Avg. speed (km/h)	Engine time (hh:mm:ss)	Moving time (hh:mm:ss)	Idle time (hh:mm:ss)	Over RPM (hh:mm:ss)	Excess speed (hh:mm:ss)	CO2 Emissions (Kg)	DTC
Paul_J1979_7000146	000000081548260	82.7	2.6	3.2	6	4	54.4	01:31:14	01:31:14	00:00:00	00:00:00	00:00:00	6.1	0
	1M8GDM9AXKP042786							0.3 %	100.0 %	0.0 %	0.0 %	0.0 %		
Total		82.7	2.6	3.2	6	4	54.4	01:31:14	01:31:14	00:00:00	00:00:00	00:00:00	6.1	0
								0.3 %	100.0 %	0.0 %	0.0 %	0.0 %		

Monthly Aggregate Vehicle Report Card

Vehicle

Daily Score

Daily Hard Brake Count

Daily Sharp Acceleration

Daily Sharp Lateral Motion

Daily Excess Speeding Events*

Company	WebTech Wireless Inc			From	8/24/2009 9:31			To	8/29/2009 10:31					
Vehicle	Date	Score	Distance (km)	Avg. speed (km/hr)	Max speed (km/hr)	Brake count	Sharp Acceleration	Sharp lateral motion	Engine time (hh:mm:ss)	Moving time (hh:mm:ss)	Idle time (hh:mm:ss)	Excess speed (hh:mm:ss)	Excess speeding events	Average excess speed (hh:mm:ss)
Jerald_VehicleScor	8/24/2009	74.10%	24.14	43.9	82.9	1	9	N/A	0:43:17	0:33:01	0:10:16	0:01:03	5	0:00:12
Jerald_VehicleScor	8/25/2009	78.40%	28.97	44	92.6	0	14	N/A	0:48:51	0:39:32	0:09:19	0:01:17	6	0:00:12
Jerald_VehicleScor	8/26/2009	72.80%	25.75	40.1	95.8	5	14	N/A	0:50:32	0:38:30	0:12:02	0:02:20	6	0:00:23
Jerald_VehicleScor	8/27/2009	80.60%	14.48	46.8	96.6	1	6	N/A	0:22:17	0:18:35	0:03:42	0:01:00	3	0:00:20
jim	8/24/2009	74.10%	24.14	43.9	82.9	1	9	N/A	0:43:17	0:33:01	0:10:16	0:01:03	5	0:00:12
jim	8/25/2009	78.40%	28.97	44	92.6	0	14	N/A	0:48:51	0:39:32	0:09:19	0:01:17	6	0:00:12
jim	8/26/2009	70.50%	12.87	39.2	95.8	3	10	N/A	0:26:32	0:19:43	0:06:49	0:00:34	2	0:00:17
Rizah_7001183	8/27/2009	65%	3.22	34.1	63.6	4	1	3	0:07:42	0:05:40	0:02:02	0:00:00	0	0:00:00
Rizah_7001183	8/28/2009	82%	22.53	74.6	82.9	4	1	1	0:21:16	0:18:08	0:03:08	0:01:20	4	0:00:20

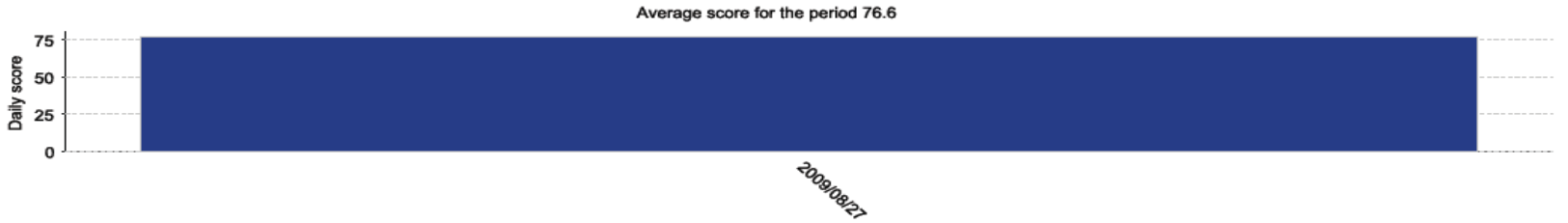
- Sent once per month
- Results of each day per vehicle for the month

  * Excess Speeding is based on 60 mi/h

Driver Report Card

- Click on score for details

Vehicle	Rizah_7001183						
Average score	76.6%	Owner					
Distance (km)	3.22	Brake count	4	Engine time (hh:mm:ss)	00:07:42	Excess speed (hh:mm:ss)	00:00:00
Avg. speed (km/hr)	34.1	Sharp Acceleration	1	Moving time (hh:mm:ss)	00:05:40	Excess speeding events	0
Max speed (km/hr)	63.6	Sharp lateral motion	3	Idle time (hh:mm:ss)	00:02:02	Average excess speed	00:00:00



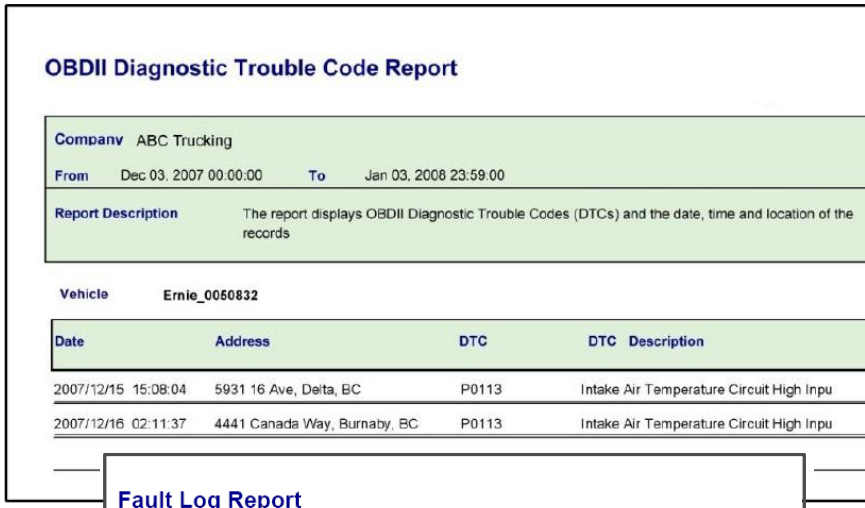
Date	Score	Distance (km)	Avg. speed (km/hr)	Max speed (km/hr)	Brake count	Sharp Acceleration	Sharp lateral motion	Engine time (hh:mm:ss)	Moving time (hh:mm:ss)	Idle time (hh:mm:ss)	Excess speed (hh:mm:ss)	Excess speeding events	Average excess speed (hh:mm:ss)
2009/08/27	76.6%	3.22	34.1	63.6	4	1	3	00:07:42	00:05:40	00:02:02	00:00:00	0	00:00:00

Vehicle Maintenance and Compliance

Monitor maintenance needs, trouble codes, emissions control system

A poorly maintained vehicle wastes fuel and increases repair costs:

- Underfilling & overfilling of fluids
- Improper wheel alignment causes tire wear, fuel use goes up 25%
- Tire inflation: 20% under-inflation leads to 3% higher fuel consumption
- Re-sale value affected



OBDII Diagnostic Trouble Code Report

Company ABC Trucking

From Dec 03, 2007 00:00:00 To Jan 03, 2008 23:59:00

Report Description The report displays OBDII Diagnostic Trouble Codes (DTCs) and the date, time and location of the records

Vehicle Ernie_0050832

Date	Address	DTC	DTC Description
2007/12/15 15:08:04	5931 16 Ave, Delta, BC	P0113	Intake Air Temperature Circuit High Inpu
2007/12/16 02:11:37	4441 Canada Way, Burnaby, BC	P0113	Intake Air Temperature Circuit High Inpu

Fault Log Report

Company: Trimac Region 1

From: Mar. 13 2007 12:58:00 To: Jan. 11 2007 13:58:00

Report Description: This report displays vehicle Jbus fault information

FMI is Failure Mode Identifier

MID is Message Identifier

PID is Parameter Identifier

SID is Subsystem Identifier

Vehicle: An207H

Date	FMI	MID	PID/SID	Fault Message
2007/12/19 00:00:09	4	128	P 27	Fan Clutch Output Driver - Voltage Low Or Open Circuit (Engine ECU)
2007/12/19 00:05:36	4	128	P 27	Fan Clutch Output Driver - Voltage Low Or Open Circuit (Engine ECU)

Handset vs. Hard-mount…. either or both!

Handheld vs Hardmount On-board

Handheld

- When the driver exits the vehicle and takes the device, the vehicle is not being tracked
- System monitoring requires tethering and cradle or Bluetooth
- POD and scanning capabilities with one device
- Driver controls power
- No satellite option
- Easy to replace
- One device for voice and data
- Price points now comparable or less than on-board alternatives

On-board

- Vehicle can be tracked
- System monitoring accessible via permanent j-bus connection
- POD and scanning only available if another device is purchased and synchronized
- Powered on/off with vehicle
- Satellite option available – least cost network selection
- Not easy to replace
- Requires two devices for voice and data

Mobile Solution Enhanced by Convergence

Shipment / Product Information

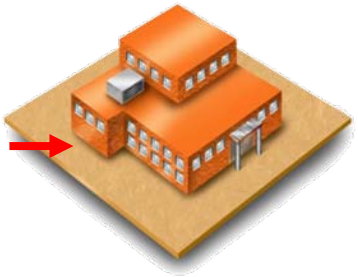
P.O.D. / Signature

GPS

Vehicle Data Bus & Sensors

Traditional In Cab Systems Non-WAN Enabled

Back Office Systems



Solution Result

- POD / Track and Trace
- Service Level Tracking
- Payroll
- Vehicle Maintenance
- Fuel Tax Reporting
- Hours Management
- Route Optimization
- Flexible Communications

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Mobile Solution Enhanced by Convergence

Shipment / Product Information

P.O.D. / Signature

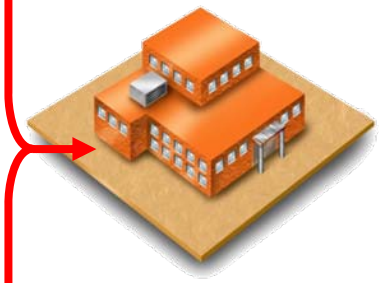
GPS

Vehicle Data Bus & Sensors

Traditional In Cab Systems WAN Enabled

Sat Comm

Back Office Systems



Solution Result

- POD / Track and Trace
- Service Level Tracking
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Screenshots* of typical handheld apps…

GPS Tracking

GPS Timesheet

GPS Wireless Forms

GPS Navigation

*Screenshots simulated

GPS Wireless Timesheets

- GPS stamped timesheets
- Clock in/out for shifts
- Clock in/out for breaks
- Shift alerts
- Overtime tracking
- Integration with payroll service

TeleNavTrack Reports >> Time Sheet Report Setup

Report Type:	Web Excel PDF
Start Date:	01/30/2005 12 : 00 : AM Show Calendar
End Date:	01/30/2005 11 : 55 : PM Show Calendar
	| Today | This Week | Last Week | This Month | Last Month |
Time Format:	Military Time Decimal Time
Save As My Report	

Submit

Notes:

The Comments.

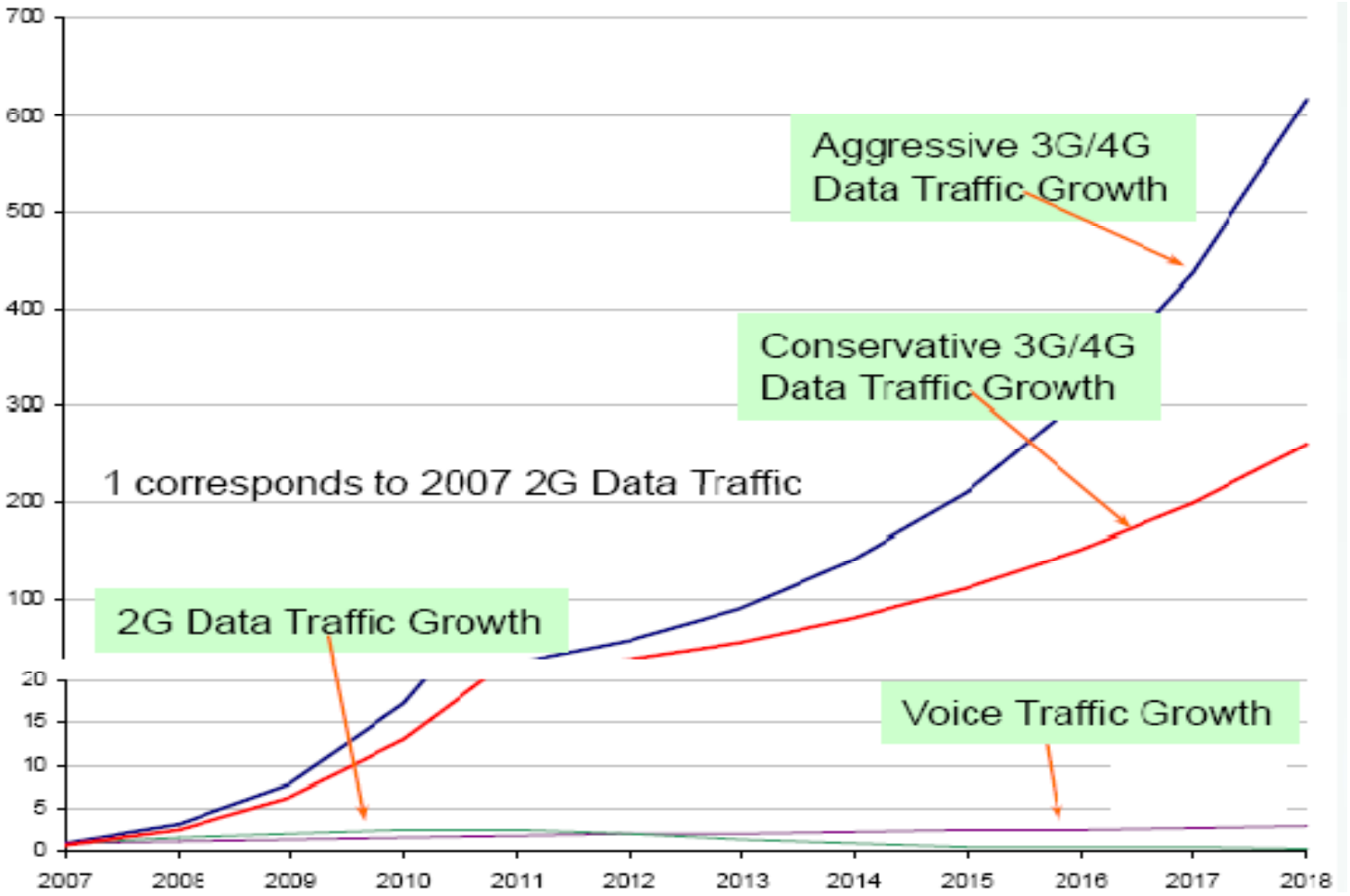
Evolution beyond today's network speeds: Why do we need it?

- ✓ Even if it's continuously growing, the Average Mobile Broadband Data Traffic per Sub still represents only a fraction (<1%) of the Average Fixed Broadband Data Traffic per Sub
  - Mobile Broadband Data Traffic expected to increase steadily towards the Fixed Broadband Data Traffic reference level

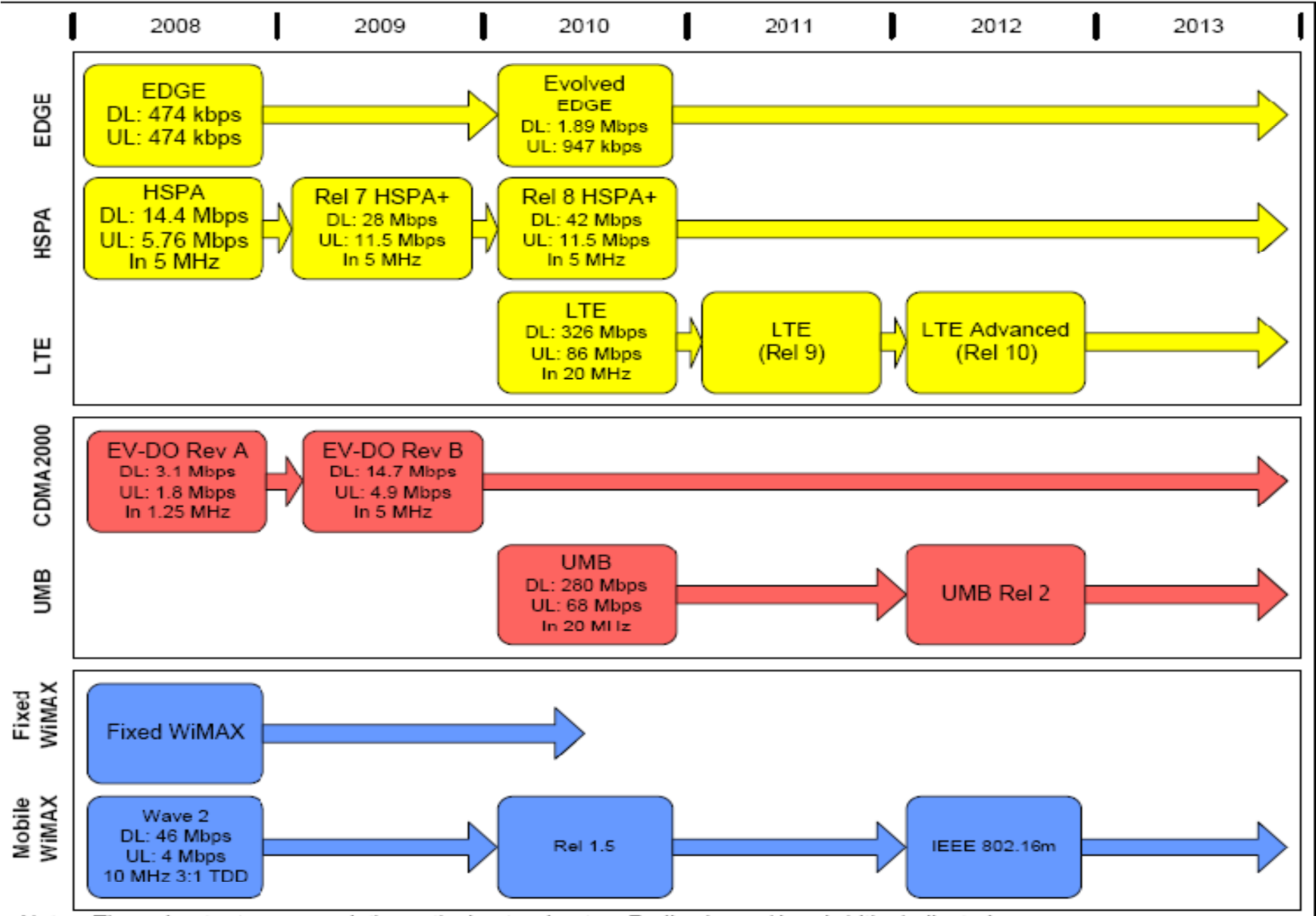
- ✓ What if Hyper-connectivity becomes a reality?
  - Every Car, Consumer Electronic Device, TV. Radio, Camera … have the possibility to access the Internet through a Mobile Broadband Connection

- ✓ These factors would result in a Data Traffic Growth explosion and a need for:
  - Higher Spectral Efficiency than 3G
  - Lower Costs than 3G
  - Simplified Architecture
  - All IP Network

Traffic Growth



Peter Rysavy, Rysavy Research
September 2008



Notes: Throughput rates are peak theoretical network rates. Radio channel bandwidths indicated.
Dates refer to expected initial commercial network deployment except 2008 which shows available technologies that year.
No operator commitments for UMB.

Peter Rysavy, Rysavy Research
September 2008

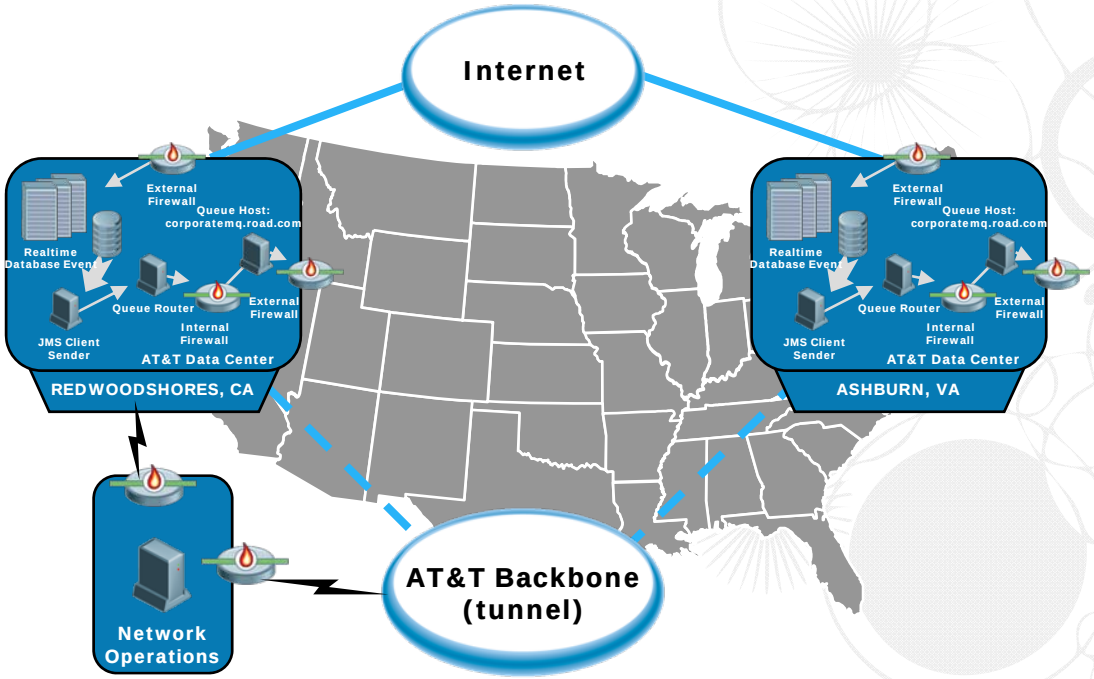
FUTURE

Through a virtual handshake between the satellite and a next-generation cellular network, the service will enable users to be reliably and securely connected to the network.

Devices may include cell phones, PDAs, laptops and embedded modules effectively outdating oversized satellite phones and expanding service delivery. Through additional network capacity where needed, and better delivery of mobile voice, data and video applications and M2M communications

AT&T Internal ROI Case Study*

- AT&T has over 85,000 vehicles, a fleet second in size only to UPS
- In 2008, AT&T will use 80M gallons of fuel for that fleet, more than $.25B dollars in fuel
- If the price of gas goes up $.01, it results in an incremental $800K in expense
- MRM is deployed on over 62,000 of AT&T Field Service Vehicles.
- AT&T realized the following benefits via their deployment of MRM:
  - Jobs Per Day Increased by 1.8
  - Expenses Reduced by 43%
  - Overtime Reduced by 54%
  - ROI in Weeks/Months
  - Fewer Motor Vehicle Accidents
  - Plus many “soft” savings



*Actual results may vary by company and with selected wireless solution. Results provided for informational purposes only and are not guaranteed

Gov't & Service Fleets: Average Savings

- 26% improvement in regulatory compliance
- 23% increase in warranty recovery
- 15% decrease in vehicle downtime
- 15% reduction in average travel time "windshield time" per job
- 28% improvement in operator compliance
- 11% reduction in maintenance costs
- 13% improvement in vehicle utilization
- 12% increase in overall service profitability
- Annual savings from operating costs alone of $1,100 per vehicle which more than justify adoption of fleet management solutions

Organizations that have placed their trust and confidence in WebTech Wireless' AVL solutions

- Texas Governor's Department of Emergency Management
- Los Angeles County Department of Public Works
- City of Los Angeles Department of Public Works
- Ports of Los Angeles and Long Beach
- City of San Francisco
- County of San Francisco
- City of Chicago
- FedEx
- Tri-Mac Transportation
- Sierra Pacific Power

Recent TxDOT AVL Trial Feedback

- **"Definitely liked the use of it … helps to know whether the workers show up on time, how long were they there, did the job take the proper amount of time, especially when a lead worker was not on site … especially helps with statewide vehicle responsibility … driver behavior improved when presented with evidence of speeding … it's an advantage to know where the vehicles are that get loaned out a lot, particularly trailers."**
  - Catherine Wolff, Traffic Data Systems Branch Engineer

- **"the biggest advantage is to be able to account for high-dollar inventory assets … finding the closest vehicle to respond to a job instead of calling one that is on the other side of the county … especially (helpful) in an emergency operation like Hurricane Ike."**
  - Johnny Martinez, Equipment Administrator, San Antonio District

- **"If we had an issue and needed to send someone there real quick we didn't have to call around and find out where they were … gave us all the engine data, so if there was a problem we would have known it immediately … a good tool for managing people … knew when they were over-speeding … did exactly what (WebTech Wireless) said it would do"**
  - Keith Harris, Equipment Administrator, Fort Worth District

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