

# On Board Monitoring Systems for Passenger Transport

TLC ENGINEERING SOLUTIONS (Pty) Ltd

# TLC ENGINEERING SOLUTIONS

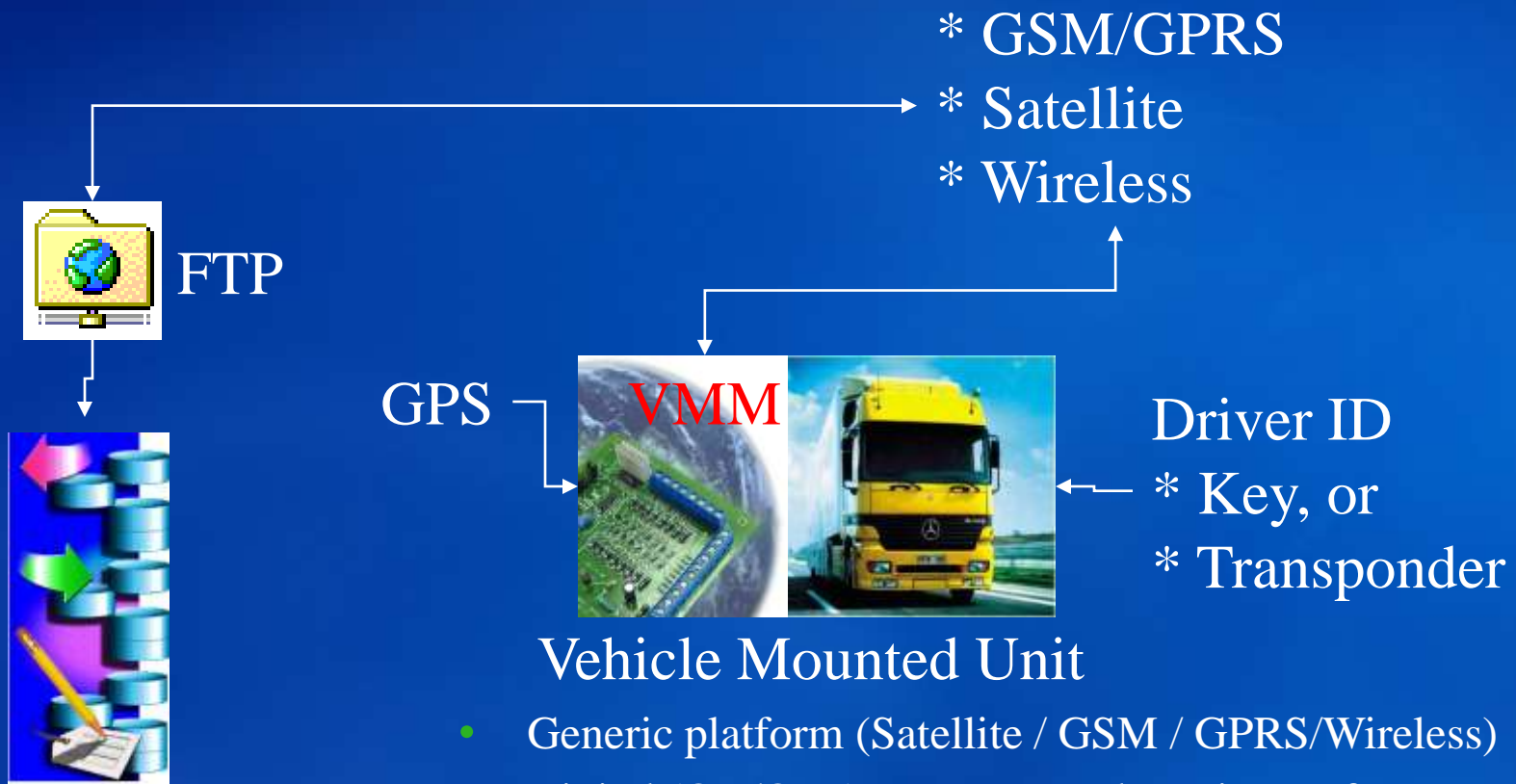
- Founded in 1988 as TLC Software.
- Joined Motswedi Group 2005
- Develop custom solutions to customer problems
- ISO9001:2000 Registered
- Internal skills
  - Project Management
  - Engineering
  - Software development
  - Hardware design
  - Manufacture
  - QC
- Multi-disciplinary / cross industry
- Solutions focus on solving technical issues

# Bus Experience

- Technology Supplier to DOT KZN pilot project for fare subsidy monitoring
  - GPS / Satellite based unit
- On board monitoring of vehicle operation
  - Overspeed / over-rev / high temp / low levels

# Objectives

- Vehicle tracking
- Engine Monitoring
- Driver Evaluation
- Route and Time adherence
- Fare Collection



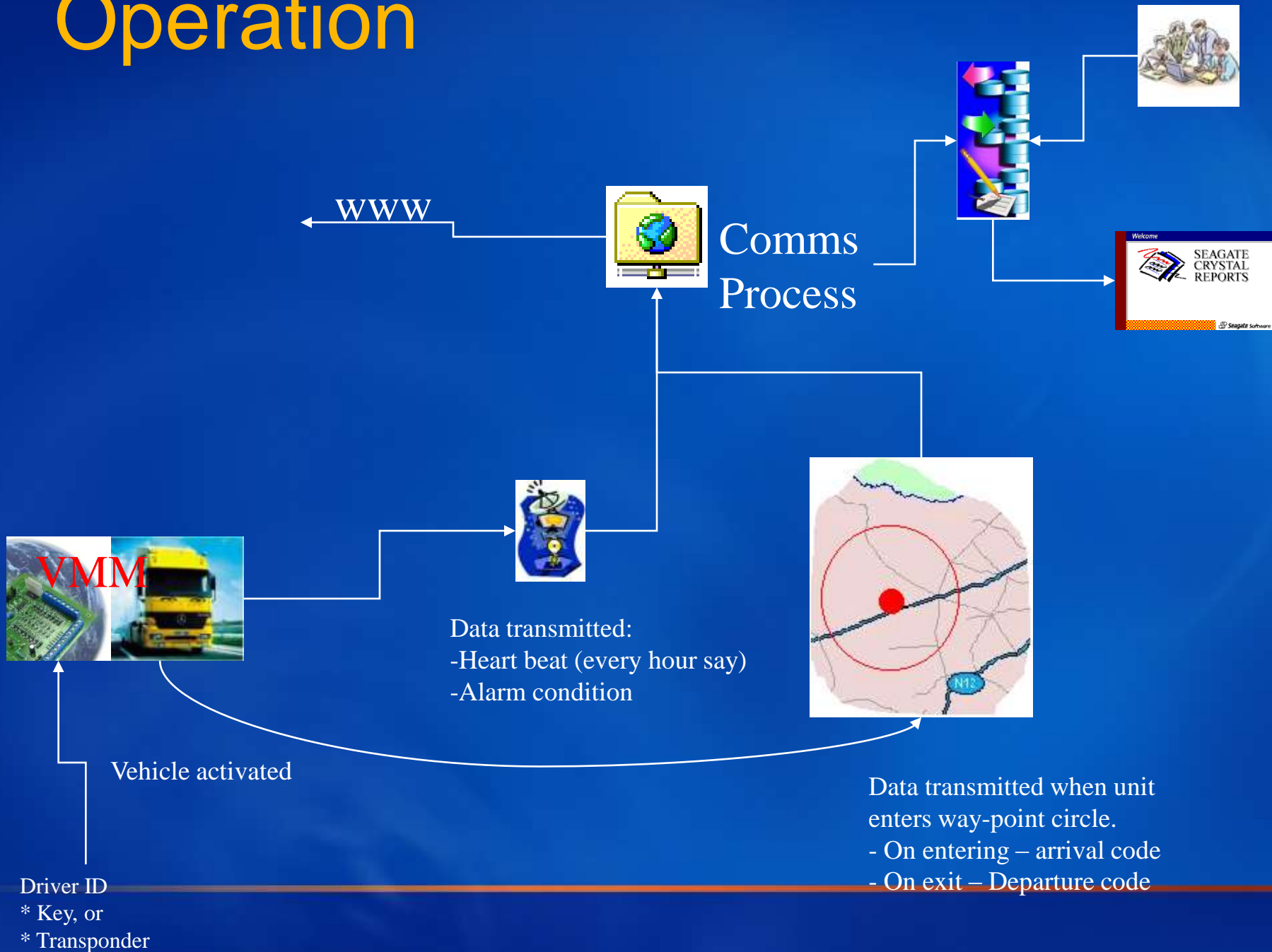
## Back Office Intelligence

- Exception Reports
- Routine Reporting
- Evaluations  
(Driver, Routes,  
Delivery Times)

## Vehicle Mounted Unit

- Generic platform (Satellite / GSM / GPRS/Wireless)
- Digital (ON/OFF) contact or voltage inputs for monitoring state changes eg. door open/close, High Water Temp, Low Water Level, Low Oil Pressure
- Analogue (Multi State) inputs e.g fuel level, voltage etc.
- Counter (Pulsed) inputs e.g. flow rate, rpm, speed etc.
- Way Points

# Operation



# Back-Office Application



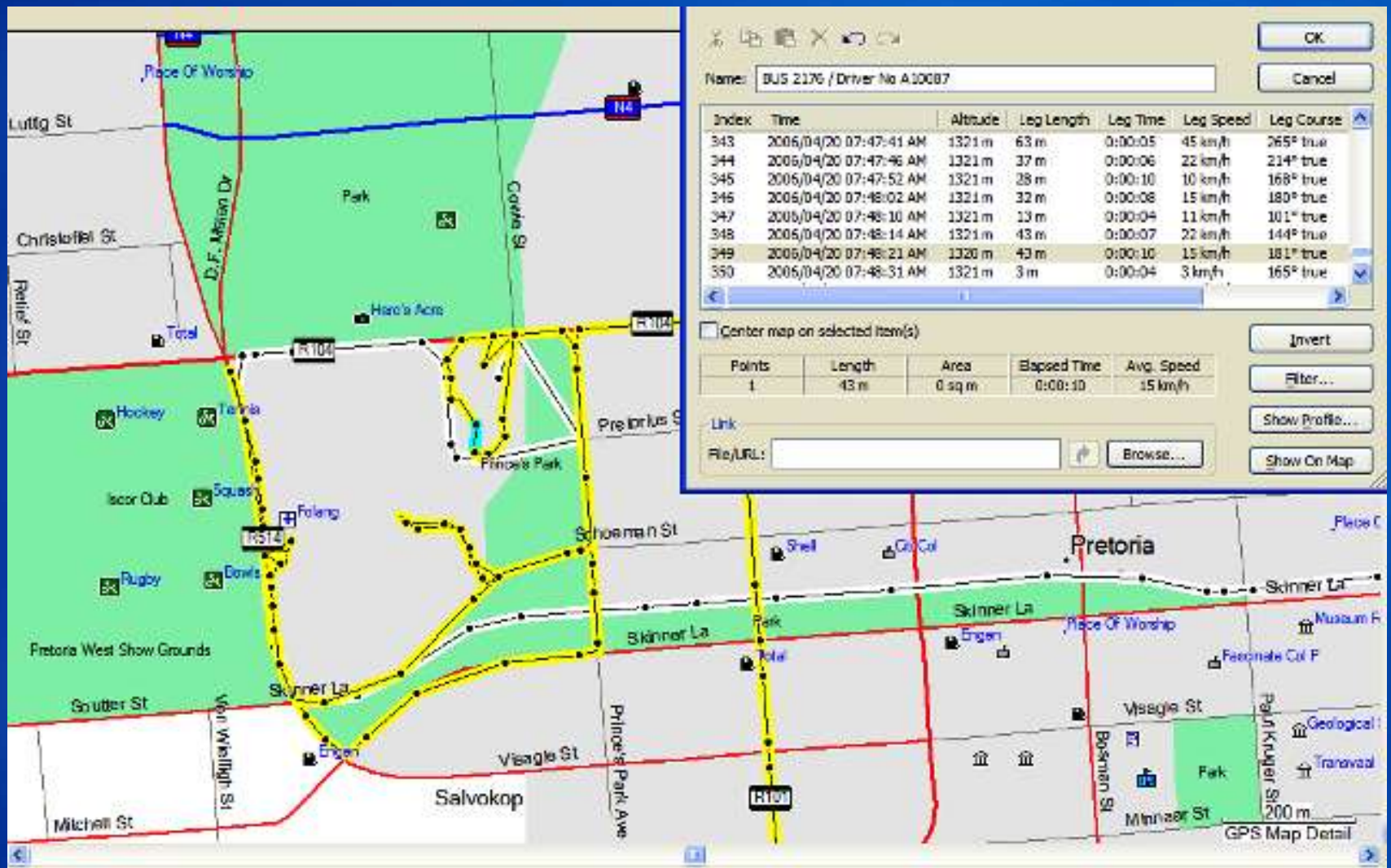
- Situated at Client's Office
- Using SQL Database Engine and Crystal Reports
- Vehicle Data input via ftp site (Needs to be setup at client)
- Application customization via Windows front-end:
  - Driver Details
  - Routes
  - Time-tables
  - Bus Duty allocation (daily)
  - Passenger Count with locations
  - Fare reconciliation
- Access to GIS mapping

# Reports

- Driver Evaluation
  - Driver ID, Routes, Driving time, Alarms during operation, route and time adherence
- Vehicle based reports (maps and coordinates)
- Vehicle Route adherence reports
- Passenger density



# Mapping Application




# Reporting Application

Preview

59125945  
59197802


**SATELLITE DATA REPORT**

From: 25/03/2001 12:02:03AM  
To: 25/03/2001 12:09:18PM  
Print Date: 25/03/2001




<u>UNIT NUMBER</u>	<u>DATE &amp; TIME</u>	<u>SPEED</u>	<u>TEMP.</u>	<u>VOLTAGE</u>	<u>ALTITUDE</u>	<u>HEADING</u>	<u>LATITUDE</u>	<u>LONGITUDE</u>
59125945	25/03/2001 00:02	0	0	0	400	190	-28.4494	21.2592
59125945	25/03/2001 01:03	0	0	0	400	140	-28.4492	21.2594
59125945	25/03/2001 02:02	0	0	0	400	295	-28.4494	21.2592
59125945	25/03/2001 04:03	0	0	0	400	285	-28.4494	21.2592
59125945	25/03/2001 05:01	100	0	0	400	75	-28.3639	21.6194
59125945	25/03/2001 06:02	100	0	0	600	70	-28.1381	22.4533
59125945	25/03/2001 08:01	100	0	0	600	75	-27.4453	23.4869
59125945	25/03/2001 09:03	100	0	0	700	65	-27.2078	24.1028
59125945	25/03/2001 10:02	100	0	0	600	70	-26.9172	24.8811
59125945	25/03/2001 12:09	100	0	0	700	120	-26.8236	26.5369
59197802	25/03/2001 04:52	0	0	0	500	320	-17.7919	25.2639
59197802	25/03/2001 05:56	100	0	0	400	170	-17.8861	25.2139
59197802	25/03/2001 06:59	50	0	0	500	165	-18.5636	25.6278
59197802	25/03/2001 07:50	80	0	0	500	155	-19.2589	25.8175
59197802	25/03/2001 09:07	90	0	0	500	165	-19.9208	26.1461
59197802	25/03/2001 09:49	50	0	0	500	120	-20.2139	26.1864
59197802	25/03/2001 10:51	90	0	0	500	110	-20.6756	26.7122
59197802	25/03/2001 11:55	90	0	0	500	155	-21.0864	27.4278

Page 1 of 1



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# Route and Time Adherence Module

Routes are created using pre-defined stops (or Way-points)



## TRIP DEFINITIONS REPORT

2001/03/2

<u>TRIP NUMBER</u>	<u>FROM:</u>	<u>TO:</u>	<u>VIA:</u>	<u>Km (tar):</u>	<u>Km (Gravel):</u>	<u>Total Km:</u>
0001-201-01	PP_RANK	FRIS_2_EKUTHULENI	FRIS GEW A AGD	17.80	7.10	24.90
0001-203-10	MADULINI_KWALAMULELA	MADULINI_KWALAMULELA	GW EBU	0.00	0.00	0.00
0001-501-01	Vryheid Rank	Ndatshane	Blood River	1.00	1.00	2.00
0001-501-01	Vryheid Rank	Ndatshane	Nkande	1.00	1.00	2.00
0001-501-01	Vryheid Rank	Ndatshane	Ncome Prison	1.00	1.00	2.00
0001-501-01	Vryheid Rank	Ndatshane	Hahdu NKA41	1.00	1.00	2.00
0002-201-03	FRIS_2_EKUTHULENI	PP_RANK	FRIS GEW A AGD	17.80	7.10	24.90
0002-202-12	PHUZWANE	PP_RANK	NKANGALA_R_3A010	1.00	1.00	2.00
0002-202-12	PHUZWANE	PP_RANK	TOLOA GELA	1.00	1.00	2.00
0003-201-01	PP_RANK	PHUZWANE	SLANGSPRUIT	11.20	14.50	25.70
0003-202-01	PP_RANK	GW EBU	MADULINI_KWALAMULELA	18.60	25.10	43.70
0003-501-01	Vryheid Rank	Ndatshane	Blood River	1.00	1.00	2.00

# Route and Time Adherence...

Vehicles are assigned duties (i.e. trips) for specific days:



## **BUS DUTIES REPORT**

26/03/2001

<u>BUS NUMBER</u>	<u>DATE</u>	<u>DUTY</u>	<u>TIME</u>	<u>OPERATIONAL DAYS</u>
1	1-Feb-01	203	103 5:10	M-F
1	1-Feb-01	204	104 17:00	M-F
5	1-Feb-01	203	103 17:30	M-F
5	1-Feb-01	205	105 8:00	M-F
6	1-Feb-01	201	101 4:00	M-F
6	1-Feb-01	204	104 13:00	M-F
6	1-Feb-01	204	104 14:45	M-F
6	1-Feb-01	205	105 16:30	M-F

# Route and Time Adherence...

Field information consists of gps locations as well as way-point status:



## ACTUAL BUS STOPS SERVICED

### NONDWENI BUS SERVICES VRYHEID

From: 26/03/2001

To: 26/03/2001

Report Date: 26/03/2001

<u>Bus Number</u>	<u>Date</u>	<u>Bus Stop Name</u>	<u>Arrival/Departure</u>
2	2001/03/26	08:58:00AM Vry Rank	D
2	2001/03/26	09:12:00AM Vry Rank	D
2	2001/03/26	09:14:00AM Depo	D
2	2001/03/26	09:23:00AM Vryheid Rank	D
2	2001/03/26	09:37:00AM Vry Rank	D
3	2001/03/26	05:20:00AM Esiqondini	
3	2001/03/26	05:49:00AM Mdlalose	
3	2001/03/26	05:59:00AM Duval Flats	
3	2001/03/26	06:18:00AM Depo	
3	2001/03/26	12:41:00PM Vry Rank	
3	2001/03/26	01:04:00PM Vryheid Rank	
3	2001/03/26	01:05:00PM Vry Rank	
3	2001/03/26	01:21:00PM Duval Flats	
3	2001/03/26	01:32:00PM Mdlalose	
3	2001/03/26	02:21:00PM Esiqondini	
3	2001/03/26	02:59:00PM Mdlalose	



## OPERATIONAL REPORT

### NONDWENI BUS SERVICES VRYHEID

From: 2001/03/26

To: 2001/03/26

Report Date: 26/03/2001

<u>BUS NUMBER</u>	<u>DATE</u>	<u>LONGITUDE</u>	<u>LATITUDE</u>
2	26/03/2001 12:00:00AM	30.7119	-27.9770
2	26/03/2001 12:15:00AM	30.7119	-27.9770
2	26/03/2001 12:30:00AM	30.7119	-27.9770
2	26/03/2001 12:45:00AM	30.7119	-27.9770
2	26/03/2001 01:00:00AM	30.7119	-27.9770
2	26/03/2001 01:15:00AM	30.7119	-27.9770
2	26/03/2001 01:30:00AM	30.7119	-27.9770
2	26/03/2001 01:45:00AM	30.7119	-27.9771
2	26/03/2001 02:00:00AM	30.7119	-27.9770
2	26/03/2001 02:15:00AM	30.7119	-27.9770
2	26/03/2001 02:30:00AM	30.7119	-27.9770
2	26/03/2001 02:45:00AM	30.7119	-27.9770
2	26/03/2001 03:00:00AM	30.7119	-27.9770
2	26/03/2001 03:15:00AM	30.7119	-27.9770
2	26/03/2001 03:30:00AM	30.7119	-27.9770
2	26/03/2001 03:45:00AM	30.7119	-27.9770
2	26/03/2001 04:00:00AM	30.7119	-27.9770
2	26/03/2001 04:15:00AM	30.7101	-27.9746

# Route and Time Adherence...

Duty allocations and field data are combined to produce adherence report:



## PENALTY REPORT

### NONDWENI BUS SERVICES VRYHEID

From: 01/02/2001

To: 01/02/2001

Print Date: 26/03/2001

<u>DAY</u>	<u>BUS NUMBER</u>	<u>DUTY NUMBER</u>	<u>OPDAY</u>	<u>TRIP NUMBER</u>	<u>BUS STOP NAME</u>	<u>BUS STOP TIME</u>	<u>ACTUAL BUS STOP TIME</u>	<u>TIME DISCREPANCY</u>
01/02/2001	1	203	M-F	04 201.17	Maphaswane ni	510.00		
01/02/2001	1	203	M-F	04 201.17	Non dweni Section 5	519.00	537.00	018.00
01/02/2001	1	203	M-F	04 201.17	Barlley Side	524.00		014.00
01/02/2001	1	203	M-F	04 201.17	Mhlumgwana	533.00	545.00	012.00
01/02/2001	1	203	M-F	04 201.17	Dural Flat	619.00	617.00	002.00
01/02/2001	1	203	M-F	04 201.17	IMPUSUKO	629.00		
01/02/2001	1	203	M-F	04 201.17	Vryheid Rank	644.00	650.00	006.00
01/02/2001	1	204	M-F	01 201.01	Vryheid Rank	1700.00	1700.00	000.00
01/02/2001	1	204	M-F	01 201.01	Rhifonain	1714.00		
01/02/2001	1	204	M-F	01 201.01	Dural Flat	1722.00	1721.00	001.00
01/02/2001	1	204	M-F	01 201.01	Mhlumgwana	1808.00	1750.00	018.00
01/02/2001	1	204	M-F	01 201.01	Barlley Side	1815.00	1753.00	022.00
01/02/2001	1	204	M-F	01 201.01	Ndibukathini	1840.00	1822.00	018.00
01/02/2001	5	203	M-F	03 201.01	Vryheid Rank	1730.00	1730.00	000.00
01/02/2001	5	203	M-F	03 201.01	Rhifonain	1745.00		
01/02/2001	5	203	M-F	03 201.01	Dural Flat	1754.00	1747.00	007.00
01/02/2001	5	203	M-F	03 201.01	Mhlumgwana	1841.00	1818.00	023.00
01/02/2001	5	203	M-F	03 201.01	Barlley Side	1847.00	1822.00	025.00
01/02/2001	5	203	M-F	03 201.01	Non dweni Section 5	1855.00	1829.00	026.00
01/02/2001	5	203	M-F	03 201.01	Maphaswane ni	1905.00		
01/02/2001	5	203	M-F	02 201.17	Ndibukathini	800.00	759.00	001.00

# Route and Time Adherence...

Whereabouts information:



## OPERATIONAL BUSES REPORT

From: 2000/07/01

To: 2001/03/26

Print Date: 26/03/2001

<u>Client Name</u>	<u>Bus Number</u>	<u>Earliest Contact</u>	<u>Last Contact</u>
<b>MIDLANDS BUS SERVICES PAULPIETERSBURG</b>			
	11	02/07/2000	07/03/2001
	12	25/01/2001	10/03/2001
	14	01/07/2000	30/12/2000
	20	01/07/2000	26/03/2001
	22	01/07/2000	14/03/2001
	40	01/07/2000	09/08/2000
	50	01/07/2000	29/07/2000
<b>NKANDE BUS SERVICE VRVHEID</b>			
	34	26/01/2001	26/03/2001
	35	26/01/2001	22/03/2001
	36	25/01/2001	26/03/2001
	37	23/07/2000	20/11/2000
	38	25/01/2001	08/03/2001
<b>NONDWENI BUS SERVICES VRVHEID</b>			
	1	25/01/2001	20/03/2001
	2	25/01/2001	26/03/2001
	3	01/01/2001	26/03/2001
	4	06/10/2000	07/10/2000
	5	25/01/2001	10/03/2001

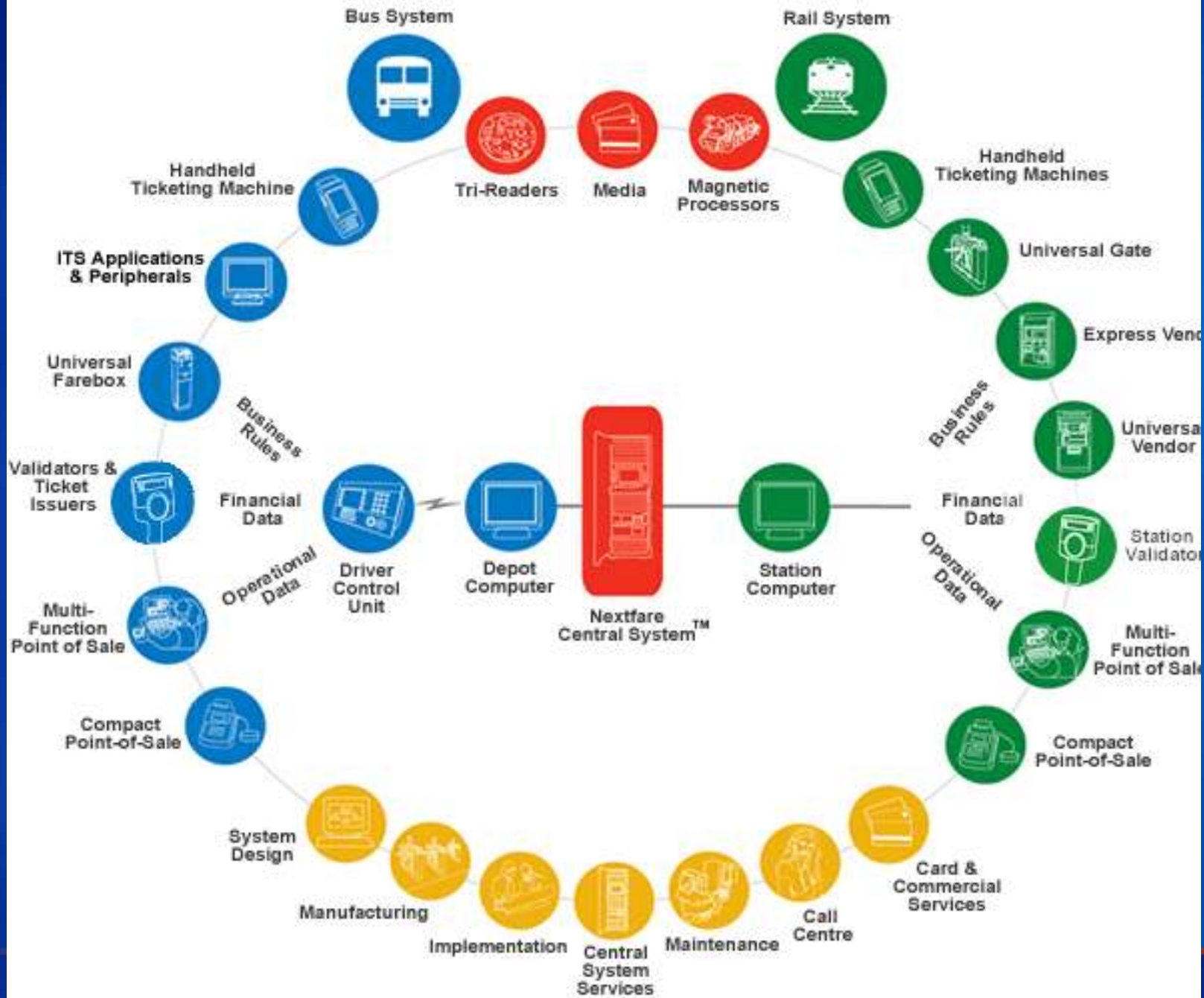
# User benefits

- Real-time information on the fleet
- Accurate logging of trips and duties
- Asset protection capabilities
- Continuous logging of key safety parameters
- Break-down/emergency panic functionality
- Scalability. Any number of vehicles and depots can be accommodated.



# Fare Collection

- Fast
- Simple
- Inexpensive (media)
- High reliability
- Foolproof
- Eliminate fare evasion
- Inter-modal
- Scalable
- Local Support



# On-Board Units





Your Engineering Solutions Partner

# Fare Experience

- 40 Countries
- 90000 Devices
- \$35m collected daily
- 30 years experience

Chattanooga Area Regional Transportation Authority (Chattanooga, TN)  
Chicago Transit Authority (Chicago, IL)  
Chula Vista Transit (Chula Vista, CA)  
Command Bus (Brooklyn, NY)  
Community Bus Lines (Passaic, NJ)  
Corridor Transportation Corp. (Laurel, MD)  
Culver City Municipal Bus Lines (Culver City, CA)  
Direct Access to Regional Transit (Chula Vista, CA)  
Fairfax Connector (Fairfax, VA)  
Fairfax CUE Bus (Fairfax, VA)  
Five Mile Beach (N. Cape May, NJ)  
Foothill Transit (West Covina, CA)  
Frederick Transit (Frederick, MD)  
Golden Empire Transit (Bakersfield, CA)  
Grand Rapids Area Transit Authority (Grand Rapids, MI)  
Green Bus Lines, Inc. (Jamaica, NY)  
Harford County Transportation Services (Bel Air, MD)  
Houston Metropolitan Transit Authority (Houston, TX)  
Howard County Transit (Laurel, MD)  
Interurban Transit Partnership (Grand Rapids, MI)  
Jacksonville Transportation Authority (Jacksonville, FL)  
Jamaica Buses, Inc. (Jamaica, NY)  
Los Angeles Dept of Transportation (Los Angeles, CA)

# Summary

- Have products and solutions for on-board, depot and head-office
- Local expertise and support
- Able to provide a custom solution
- Fare collection from a global partner which will integrate with other transport system offerings

# Contact Details

For more information contact:

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