STW’s Connectivity Solution for Mobile Equipment: The Vehicle Data System (VDS) and VDS-Remote (VDS-R)
The Evolving World of Off-Highway Data and Connectivity

- Data mining is becoming more critical each year for every industry, manufacturer, distributor and owner
- Access to all of the data on a vehicle can be facilitated by a single device
- Applications for data mining:
  - Quasi-realtime Remote Diagnostics
  - Data Logging
  - Vehicle tracking/mapping (asset management)
  - Trend Analysis
  - Performance Analysis
  - Operational Record-keeping
  - Usage statistics
  - Maintenance Scheduling
  - Warranty Tracking/resolution of claims
  - Job control/tracking/scheduling
  - Software downloading/flashing/updates
STW’s Vehicle Data System (VDS)

- Integrated hardware and software telematics architecture to enable flexible access to vehicle data
- Web-based configuration, monitoring and logging
- Out-of-the-box functionality for rapid implementation
- Powerful toolset for user applications or customization
- Multiple networking options – Local and Remote Modes!
- Real-time monitoring or event-based logging
- Perfect as a front-end for OEM- or fleet-customized back-end solutions
- Designed for difficult, demanding environments
The Three Ways to Create Telematics Solutions Using VDS

1. Develop a custom telematics application using the Linux O/S
   - Full programming flexibility and freedom
   - Extensive open source application libraries available

2. Use STW’s Telematics Application Framework to develop a telematics application
   - Utilize STW’s daemons and API’s to accelerate and guide development

3. Use STW’s data readers, logger and/or monitoring application for ‘out-of-the-box’ functionality or to connect to back-end analytics or web services
   - Web configuration of all components
   - Full-featured logging application
   - Web-based monitoring and diagnostics application
   - Full remote administration, monitoring and logging capabilities
VDS Hardware Architecture

- **Full stand-alone Telematics: ESX-TC3G**
  - Local networking: Ethernet, CAN, USB, RS232 **PLUS**
  - GPS, GSM/CDMA, WLAN or Bluetooth with internal or external antennas
  - 460 MHz Processor with Linux and 1 GB flash

- **Controller Networking – Eb07 Babyboard for ESX-3XL**
  - Same as the ESX-TC3G without the modems/antennas
  - Accessible directly from the controller with CoDeSys or C functions
Two Ways to Access Vehicle Data

- **VDS Local**
  - Wireless host access at the TC3 or TC3G
  - TC3 or TC3G is a wireless client to a wifi router
  - Any web browser capable device (tablet, PC, phone, etc.) can access
  - Traffic does NOT go through a server! No cellular data plan required

- **VDS Remote**
  - TC3 or TC3G is accessed through a server
  - Same functionality as local except for addition of Administration functions
  - Requires a cellular connection unless the TC3G or TC3 is connected to the Internet locally
VDS Network Connectivity

LOCAL ACCESS

- TC3/TC3G
- Wifi – Access Point (TC3G)
- Wifi – Ad Hoc (TC3)
- Ethernet

Remote Access

- GSM/CDMA
- Ethernet
- Wifi router
VDS-R Security

- Userid/password required for all access
- All network traffic uses https (Norton/Symantec with full certification)
- Network connections from VDS-R to the devices use https as well
VDS Security

Connection Security
• HTTPS

Network Security:
• WLAN: password
• Ethernet: LAN dependent
• Access Point: password and configurable ssid

Application security:
• User password/session access

Device Security
• Root access password

LOCAL ACCESS

Access device with supported* web browser

TC3/TC3G

STW server

*supported web browser

VDS Local vs VDS Remote

- VDS Remote has administrative functions; VDS local does not
- VDS Local and Remote share Reader and Logger configuration files
- Log files from VDS Local can be accessed and downloaded through VDS Remote
- VDS Local and Remote have different Diagnostics configuration files
- Diagnostics data from VDS Local is accessed by VDS Remote, but the Diagnostics Project is different
VDS Remote

- Two primary modes of operation – Admin and Dashboard
- Admin allows administration of VDS for a company or group of companies and its/their users and devices
- Dashboard allows Users to access their devices and configure/operate the devices based on their role and associated permissions
VDS-R Admin Concepts

- Groups
  - A group is either a client or department with associated devices and users
  - Any hierarchy of groups is allowed

- Users/Roles/Permissions
  - A User is an individual who belongs to one or more groups and is assigned a single role.
  - The User is given a user name (email address) and password and is authenticated based on these.
  - Roles are a collection of permissions that determine what a User can do and what he/she has access to view/edit/delete.
  - Each User is assigned a single role.

- Devices
  - A device is a single TC3/TC3G
  - A device may be assigned to one or more Groups.
  - Each group can assign names/aliases for their devices.
VDS-Remote: Admin

Select from one of the options on the side bar.

- Operations
  - NewCompanyA
  - NewCompanyB

- Users & Roles

- Devices
Adding New User

First Name

Middle Name

Last Name

Email

Groups
(Note: If a new group is created under selected groups, this user will automatically belong to that group as well)

- Acme Manufacturing

Roles

- Master

- Viewer

Create User  Cancel
## VDS Admin – Role Permissions

![VDS Admin screen](image)

### Permissions

<table>
<thead>
<tr>
<th>Permissions</th>
<th>Viewer</th>
</tr>
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<tbody>
<tr>
<td>general</td>
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<tr>
<td>access admin page</td>
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<td>groups</td>
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<td>edit group</td>
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<td>delete group</td>
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<td>see all groups</td>
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<tr>
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<tr>
<td>edit device</td>
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<td>delete device</td>
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<td>change device id</td>
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<td>device apps</td>
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<tr>
<td>start apps</td>
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<tr>
<td>stop apps</td>
<td>☐</td>
</tr>
<tr>
<td>device configuration</td>
<td></td>
</tr>
</tbody>
</table>
VDS Admin - Devices

Adding New Device

Device Alias

Serial Number

Device Type

Department Assignment

- Acme Manufacturing

Client Assignment

<table>
<thead>
<tr>
<th>Client Name</th>
<th>Service Enable</th>
</tr>
</thead>
</table>

Create Device  Cancel
VDS Remote - Dashboard

- Dashboard allows User to ‘Connect’ to an individual device
- Dashboard has same functions as VDS Local
- User is accessing the device ‘through’ the VDS Remote server
- Look and feel is different from VDS Local, but functions are the same
System Configuration

TC3-102053721002

- Variant: tc3_A_C
- Bsp version: 3022
- Uptime: 516039.87 sec
- CAN0 baud: 500 KB/s
- CAN1 baud: 500 KB/s

Network Configuration

DHCP enabled:
- IP: 192.168.20.46
- Submask: 255.255.255.0
- Broadcast: 192.168.20.255
- Gateway: 192.168.20.254
- DNS: 192.168.20.4

Static disabled:
- IP: 192.168.200.1
- Submask: 255.255.255.0
- Broadcast: 192.168.200.255
- Gateway: 192.168.200.1
- DNS: 192.168.1.8
GPS Reader

Variable Names:

- status: gps_stats
- latitude: gps_lat
- longitude: gps_long
- altitude: gps_alt
- time: gps_time
- satellites: gps_sat
- quality: gps_qual
- warning: gps_warn
- speed: gps_speed
- course: gps_course
- date: gps_date
- UTC: gps_utc

Start GPS reader  Stop Applications
Logger configuration

31 July 2009, STW, Norcross, Bob Geiger
Event Triggering
Monitoring and Diagnostics
File System – Uploads and Downloads
Flashloader – Over the air (OTA) updates of controller software

Important note: Flashloading your STW controller must be done very carefully. It will take the vehicle or machine out of operation for a period of time and has safety implications. If the wrong hex file is flashed it could also render your vehicle inoperable.

The Flashloader will use the hex file you have uploaded in the File Transfer section of VDS.

Please ensure that this is the RIGHT file before you proceed!

Communication:
- Local ID: 0
- Company ID: V2
- Send ID: 61

System:
- Type of HEX file: Automatic
- Select CAN Bus: can_0
- Select CAN baudrate: 500
- Reset Method: Manual
Vehicle Data System

Network Buses

- CAN
- RS-232
- Ethernet
- WIFI
- Cellular
- GPS
- TC3G Ports/Modems

TC3G Readers

CAN Free style
J1939
NMEA
ISO BUS
GPS
CAN Open

Datapool Daemon

Event Handler

Log Files

Datapool

Diagnostics Monitoring Web App

Other applications Or Interfaces to Cloud/Web Svcs

Logger

Logger File Mgmt And Xfer

USB

WIFI Cellular

CAN

J1939
NMEA
ISO BUS
GPS
CAN Open

http