

OVERVIEW

The KUPE position monitoring and vehicle management system is a suite of server applications for the Microsoft Windows operating system. The software provides a centralised repository for position reports received from vehicles fitted with Xworks AVL hardware. It also provides fully automated software update services to the fleet and maintains a detailed history of the hardware and software installed in each vehicle.

FEATURES

Position Monitoring

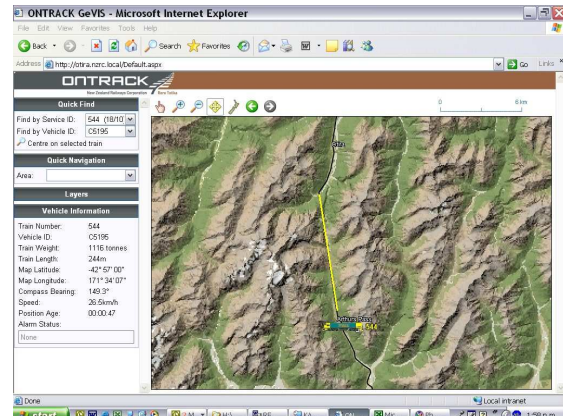
The Kupe system maintains a historical record of position reports received from vehicles equipped with compatible AVL hardware. Contained within each position report is the following information:

- Date and time of fix (from GPS)
- Quality of fix
- Latitude
- Longitude
- Course (Bearing)
- Speed
- Report trigger (time, distance etc)
- Vehicle status information

Position reports are keyed to a particular vehicle, which is identified within the Kupe system by a unique 5 digit alphanumeric code. Position reports can be searched by date and time, with the most recent position of each vehicle immediately available.

Automated Package Deployment

The Kupe system can provide automated software and configuration file updates to vehicles or other Kupe equipped installations (e.g. repeater sites) via either wired or wireless networks. Such installations, termed nodes within the Kupe system, can be grouped by function or geographic area to enable use of a common configuration. The configuration may include a specific set of waypoints, defined radio channels or perhaps a special set of warning messages. The system automatically ensures that all nodes in the group have the same configuration.



GeVis user-interface to the Kupe position reporting and vehicle management system in use by ONTRACK Limited at the National Train Control Centre in Wellington, New Zealand. (Image kindly reproduced by permission of ONTRACK Limited)

Package Deployment History

The Kupe system maintains a historical record of package deployments to each node. Information recorded by the system for each deployment includes:

- Date and time of deployment
- Package name
- Package version

This facility enables the interested user to look back over time at when the configuration for a node was updated and what version it was updated to.

Hardware Installation History

The Kupe system maintains a history of hardware installed in each node. This information is sent by the node at boot time and includes:

- Date and time of installation
- Product type
- Firmware version

This facility enables the interested user to trace the movement of hardware from one node to another over time.

Alarm Processing

While the Kupe system is functioning it maintains a log of its operations. Each message that is logged by the system has a defined priority. The user may select to be notified by email of various high priority alarms, such as the failure to automatically deploy a software update.

COMPONENTS

Relational Database

The Kupe system is built on top of an IBM DB2 relational database. All configuration and runtime data is stored within the database for quick and easy access by third party visualisation and reporting tools, including various graphical information systems (GIS).

Service Agents

The Kupe software suite is constructed from several independent Microsoft Windows service applications, known as agents. Each agent runs independently in the background without requiring user logon and can be automatically restarted by the operating system in the event of failure. This provides a robust and reliable system that is able to function without user intervention.

Comms Agent

The comms agent provides a centralised conduit through which secure binary communication with remote nodes takes place (e.g. KMC, ARK, ORC).

Location Agent

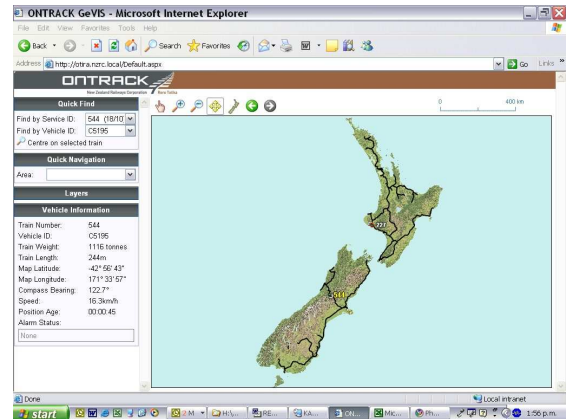
The location agent validates and process position reports received from remote nodes before storing them in the Kupe database.

Installation Agent

The installation agent maintains a detailed history of product installation information using data it receives from remote nodes at boot time.

Deployment Agent

The deployment agent is responsible for maintaining the currency of application software and configuration files in remote nodes.



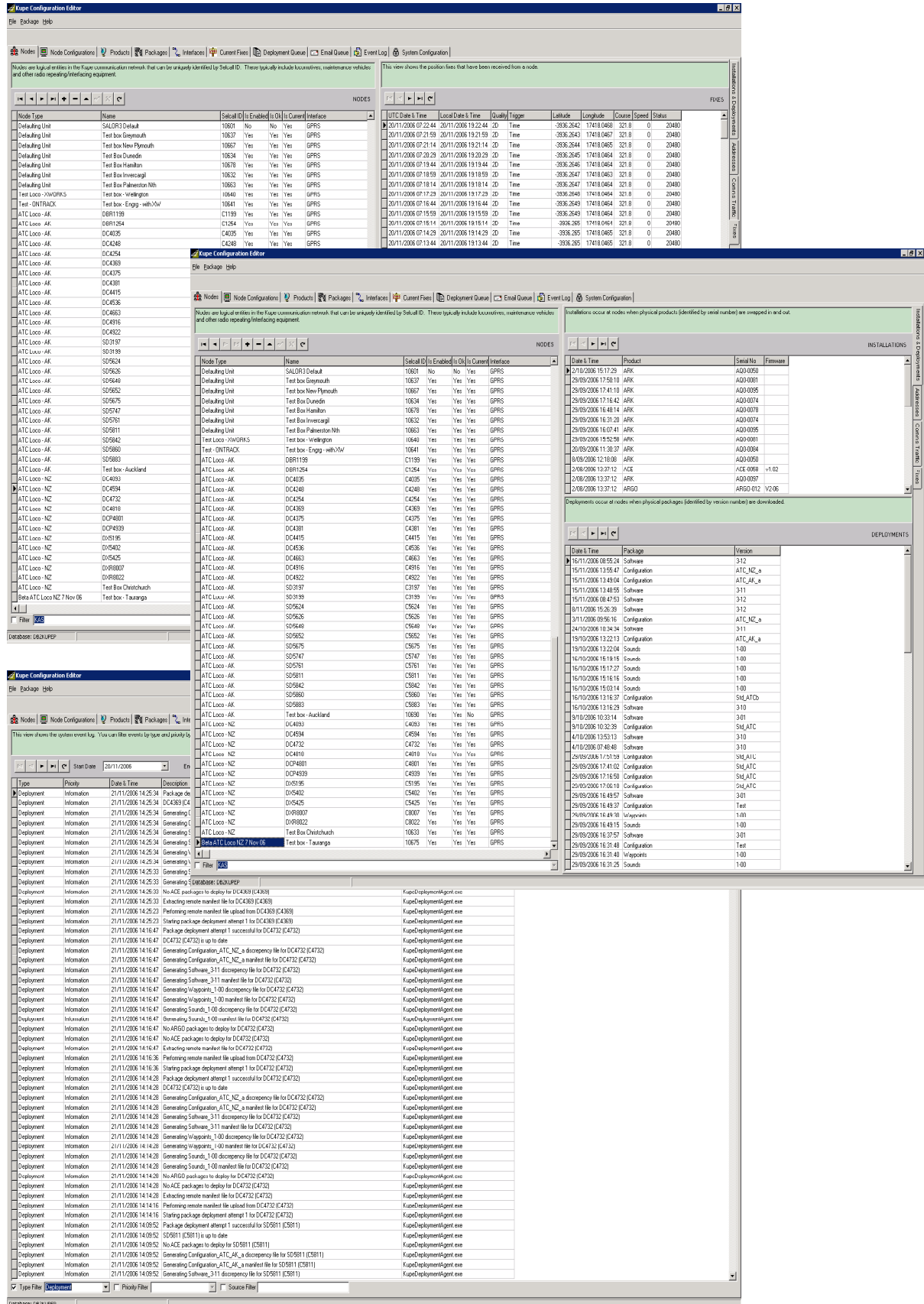
GeVis user-interface to the Kupe position reporting and vehicle management system in use by ONTRACK Limited at the National Train Control Centre in Wellington, New Zealand. (Image kindly reproduced by permission of ONTRACK Limited)

Email Agent

The email agent provides a mechanism for reporting high priority alarms and events to service and helpdesk personnel.

User Interface

The Kupe configuration editor is a graphical application for viewing and editing runtime and configuration data for the Kupe system. It obtains all information from the Kupe relational database and presents it in a simple to understand format (see screen shots attached).



Nodes Table:

Node Type	Name	Serial ID	Enabled	In	On	Cuser	Interface	UTC Date & Time	Local Date & Time	Quality	Tagger	Latitude	Longitude	Course	Speed	Status
Defaulting Unit	SALOR3 Default	10601	No	No	No	Yes	GPFS	20/11/2006 07:22:44	20/11/2006 19:22:44	ZD	Teo	-3936.2642	17418.0468	321.8	0	20480
Defaulting Unit	Test box Engsmouth	10637	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:21:59	20/11/2006 19:21:59	ZD	Teo	-3936.2643	17418.0467	321.8	0	20480
Defaulting Unit	Test box New Plymouth	10667	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:21:14	20/11/2006 19:21:14	ZD	Teo	-3936.2644	17418.0465	321.8	0	20480
Defaulting Unit	Test Box Dunebin	10634	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:20:29	20/11/2006 19:20:29	ZD	Teo	-3936.2645	17418.0464	321.8	0	20480
Defaulting Unit	Test Box Hamilton	10678	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:19:44	20/11/2006 19:19:44	ZD	Teo	-3936.2646	17418.0464	321.8	0	20480
Defaulting Unit	Test Box Invercargill	10632	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:18:59	20/11/2006 19:18:59	ZD	Teo	-3936.2647	17418.0463	321.8	0	20480
Defaulting Unit	Test Box Palmerston Nth	10663	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:18:14	20/11/2006 19:18:14	ZD	Teo	-3936.2647	17418.0464	321.8	0	20480
Test box -Whangarei	Test box Whangarei	10644	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:17:29	20/11/2006 19:17:29	ZD	Teo	-3936.2648	17418.0464	321.8	0	20480
Test -ONTRACK	Test box -Engg -with/W	10641	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:16:44	20/11/2006 19:16:44	ZD	Teo	-3936.2649	17418.0464	321.8	0	20480
ATC Loco -AK	DBR1199	C1199	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:15:59	20/11/2006 19:15:59	ZD	Teo	-3936.2649	17418.0464	321.8	0	20480
ATC Loco -AK	DBR1254	C1254	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:15:14	20/11/2006 19:15:14	ZD	Teo	-3936.265	17418.0464	321.8	0	20480
ATC Loco -AK	DC4026	C4026	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:14:29	20/11/2006 19:14:29	ZD	Teo	-3936.265	17418.0465	321.8	0	20480
ATC Loco -AK	DC4046	C4046	Yes	Yes	Yes	Yes	GPFS	20/11/2006 07:13:44	20/11/2006 19:13:44	ZD	Teo	-3936.265	17418.0465	321.8	0	20480

Installations Table:

Date & Time	Product	Serial No	Firmware
20/10/2006 15:17:29	ARX	ARX0050	
20/10/2006 17:58:10	ARX	ARX0001	
20/10/2006 17:41:10	ARX	ARX0055	
20/10/2006 17:16:42	ARX	ARX0074	
20/10/2006 16:48:14	ARX	ARX0078	
20/10/2006 16:20:20	ARX	ARX0074	
20/10/2006 16:07:41	ARX	ARX0055	
20/10/2006 15:52:28	ARX	ARX0091	
20/10/2006 11:30:37	ARX	ARX0084	
8/08/2006 12:18:08	ARX	ARX0050	
3/08/2006 12:37:12	ACE	ACE 0058	v1.02
3/08/2006 12:37:12	ARX	ARX0057	
3/08/2006 13:37:12	ARSD-012	Y036	

Deployments Table:

Date & Time	Package	Version
16/11/2006 08:55:24	Software	312
15/11/2006 13:55:47	Configuration	ATC_NZ_a
15/11/2006 13:49:04	Configuration	ATC_AK_a
15/11/2006 13:48:55	Software	311
15/11/2006 13:48:55	Software	312
3/11/2006 15:26:39	Software	312
3/11/2006 09:56:16	Configuration	ATC_NZ_a
24/10/2006 16:36:34	Software	311
15/10/2006 13:22:13	Configuration	ATC_AK_a
15/10/2006 13:22:04	Sounds	100
16/10/2006 16:18:16	Sounds	100
16/10/2006 15:17:27	Sounds	100
16/10/2006 15:16:16	Sounds	100
16/10/2006 15:03:14	Sounds	100
16/10/2006 13:16:37	Configuration	Sg_ATO
16/10/2006 13:16:29	Software	310
3/10/2006 10:33:14	Software	301
3/10/2006 10:32:39	Configuration	Sg_ATC
4/10/2006 15:53:13	Configuration	310
4/10/2006 07:40:48	Software	310
29/09/2006 17:23:59	Configuration	Sg_ATL
29/09/2006 17:41:02	Configuration	Sg_ATC
29/09/2006 17:06:10	Configuration	Sg_ATC
29/09/2006 16:49:57	Software	301
29/09/2006 16:48:37	Configuration	Test
29/09/2006 16:48:16	Wagonnets	100
29/09/2006 16:48:15	Sounds	100
29/09/2006 16:37:57	Software	301
29/09/2006 16:39:40	Configuration	Test
29/09/2006 16:39:40	Wagonnets	100
29/09/2006 16:39:25	Sounds	100

System Log:

- 20/11/2006 14:25:33 Generating Software_311 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:25:33 Generating Software_310 manifest file for DC4732 [C4732]
- 20/11/2006 14:25:33 Generating Wagonnets_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:25:33 Generating Sounds_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:25:33 Generating Sounds_100 manifest file for DC4732 [C4732]
- 20/11/2006 14:25:33 No ACE packages to deploy for DC4732 [C4732]
- 20/11/2006 14:25:33 Extracting remote manifest file for DC4732 [C4732]
- 20/11/2006 14:25:33 Performing remote manifest file upload for DC4732 [C4732]
- 20/11/2006 14:25:33 Starting package deployment attempt 1 for DC4393 [C4393]
- 20/11/2006 14:25:33 Package deployment attempt 1 successful for DC4393 [C4393]
- 20/11/2006 14:16:47 DC4732 [C4732] is up to date
- 20/11/2006 14:16:47 Generating Configuration_ATC_NZ_a discrepancy file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Configuration_ATC_AK_a manifest file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Software_311 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Software_310 manifest file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Wagonnets_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Sounds_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:16:47 Generating Sounds_100 manifest file for DC4732 [C4732]
- 20/11/2006 14:16:47 No ACE packages to deploy for DC4732 [C4732]
- 20/11/2006 14:16:47 Extracting remote manifest file for DC4732 [C4732]
- 20/11/2006 14:16:36 Performing remote manifest file upload for DC4732 [C4732]
- 20/11/2006 14:16:36 Starting package deployment attempt 1 for DC4732 [C4732]
- 20/11/2006 14:16:28 Package deployment attempt 1 successful for DC4732 [C4732]
- 20/11/2006 14:14:28 DC4732 [C4732] is up to date
- 20/11/2006 14:14:28 Generating Configuration_ATC_NZ_a discrepancy file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Configuration_ATC_AK_a manifest file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Software_311 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Software_310 manifest file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Wagonnets_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Sounds_1_00 discrepancy file for DC4732 [C4732]
- 20/11/2006 14:14:28 Generating Sounds_100 manifest file for DC4732 [C4732]
- 20/11/2006 14:14:28 No ACE packages to deploy for DC4732 [C4732]
- 20/11/2006 14:14:28 Extracting remote manifest file for DC4732 [C4732]
- 20/11/2006 14:14:16 Performing remote manifest file upload for DC4732 [C4732]
- 20/11/2006 14:14:16 Starting package deployment attempt 1 for DC4732 [C4732]
- 20/11/2006 14:09:52 Package deployment attempt 1 successful for S0581 [E581]
- 20/11/2006 14:09:52 S0581 [E581] is up to date
- 20/11/2006 14:09:52 No ACE packages to deploy for S0581 [E581]
- 20/11/2006 14:09:52 Generating Configuration_ATC_AK_a discrepancy file for S0581 [E581]
- 20/11/2006 14:09:52 Generating Configuration_ATC_NZ_a manifest file for S0581 [E581]
- 20/11/2006 14:09:52 Generating Software_311 discrepancy file for S0581 [E581]

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