

SA Newsletter

September 2009



ENGINEERS
AUSTRALIA

RTSA

NEXT CHAPTER MEETING:

Thursday 1st October

Railway Technical Society of Australasia (RTSA), SA Chapter Meeting

Railway Accident Investigation in Indonesia



Presented by Lucky Soegito, Indonesian Railways

Venue: 11 Bagot St, North Adelaide

Light Refreshments from 5.30pm, meeting commences 6.10pm

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Chapter Meetings

Thursday 1 October 2009

Chapter meeting, 11 Bagot St, North Adelaide – 'Accident Investigation in the Indonesian Railways' by Lucky Soegito.

Thursday 22 October 2009

PWI Quiz Night, details to follow shortly.

Thursday 5 November 2009

Chapter meeting – ARTC Network Enhancement investment update by Ben Leske.

Tuesday 1 December 2009

Annual Dinner meeting + AGM, Hyde Park Tavern.

Publisher

This newsletter is a publication of the South Australian Chapter of the Railway Technical Society of Australasia, Engineering House, 11 Bagot Street, North Adelaide SA 5006. Opinions expressed within are not necessarily those of the Chapter, Society or Editor.

Contributions

Contributions, including news, opinions, or letters to the editor, are always welcome. Send material by e-mail to sa-editor@rtsa.com.au

Continuing Professional Development

Engineers Australia members are reminded that attendance at RTSA technical meetings contributes towards CPD requirements. Each RTSA technical meeting generally has a value of 1 CPD point.

RTSA Website

The RTSA website www.rtsa.com.au has details of RTSA activities, including future meetings and reports from past meetings, for all Chapters.

Membership

Information for potential new members and an application form may be found at www.rtsa.com.au.

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Newsletter Dispatch

Despatch of the newsletter is undertaken by Steve Torok. Contact Steve on storok@tge.com.au if you have any problems receiving newsletter electronically or in hard copy, or change your e-mail address.

News

SA Chapter Meeting September 3rd, 2009

The last Chapter meeting contained a fascinating presentation by Mike Van de Worp, General Manager of Train Communications and Control Systems, on two of ARTC's key project areas - the implementation of a National Train Communications System (NTCS) together with the future benefits of an Advanced Train Management System (ATMS). This meeting took place at the Gil Langley Room, Adelaide Oval and was very well attended. The slides relating to the publicised NTCS presentation are attached to this newsletter. More information on ATMS can be found at <http://atms.artc.com.au>

2010 RTSA Annual Railway Engineering Awards

In 2010, the RTSA is offering awards in five different categories: Individual, Industry, Young Railway Engineer, Railway Engineering Student Thesis and Contact Mechanics. Nominations for the 2010 Engineering Student Thesis Award and the Contact Mechanics Award will close on 27 November 2009 and for all other categories, nominations will close on 28 February 2010. For more information please see: www.rtsa.com.au

Coming Events

AusRail Plus 2009, Adelaide

Between 17th-19th November, Adelaide will host the largest annual rail event in the Asia Pacific region, AusRail Plus, at the Adelaide Convention Centre. With trade exhibitions, networking functions and a program of international speakers, this 3-day conference will be the biggest rail event of 2009.

Full details can be obtained from www.ausrail.com/informa09/AusRAIL/

CORE 2010 – Wellington, NZ

The RTSA's biennial Conference on Railway Engineering (CORE) is to be held next year in Wellington, NZ with the theme 'Rail – Rejuvenation & Renaissance'. Registration for Abstract Submissions is open now until November 29th 2009. For more details please see <http://www.core2010.org.nz/>

RTSA Annual Dinner & AGM – Sponsorship Opportunities

Our Annual Dinner & AGM is being held on Tuesday 1st December, Hyde Park Tavern, at 7.30pm.

The Guest Speaker will be Mark Carter from GRMS Media with a presentation entitled "Taking the Scenic Route", including some famous (and not so famous!) rail journeys in Europe, Africa, Asia and Australia.

If your company / organisation is interested in sponsoring the event, please contact our Treasurer, Michael Forbes on 08 8217 4127.

The cost of sponsorship is \$400.00 (inclusive of GST) which includes 2 complimentary dinner invitations, plus display of your company logo in promotional material on the evening.

Chairman's Chatter

ARTC's innovative developments in communications and train management were outlined at our September meeting, hosted by IRSE.

It is often overlooked just how much innovation is occurring in the worldwide rail industry – the public image tends to belie what is occurring behind the scenes. A number of recent examples come to mind:

An Italian company has developed a concrete sleeper manufacturing plant which works like a carousel – the moulds rotate through a production line from workstation to workstation, eventually ending back up where they started. Capable of producing 80 sleepers per hour, the plant is especially suited to short runs, and frequent changes of sleeper type, with some portability.

On a related topic, an American manufacturer has developed a rail anchor for concrete sleepers. Apparently, in severe duty situations, a need has arisen for such items to assist in arresting rail creep.

Rail grinding is an area which has received much research and development attention in recent times. In Germany, focus has been on high speed grinding – at 80 km/h. The technique does not use conventional motor driven grinding stones, but rather specially shaped circular grinding wheels which are pulled along the rail at a skew angle, causing them to rotate and remove very small amounts of metal, in the order of 0.05 to 0.1 mm.

This form of grinding aims to remove a small amount of fatigued steel prior to any appreciable formation of surface cracking. It requires the rail to already be in generally good condition and of the desired profile, i.e. is not intended to correct profile deficiencies or remove surface defects.

On the other side of the wheel/rail interface, tread conditioning brake blocks are finding an increasing market. These have friction materials incorporated into the composition of the block, with the aim of removing very small amounts of wheel tread material whenever brakes are applied. This is intended to limit the development of wheel tread

defects such as shelling and spalling. Their higher initial cost in comparison to conventional brake blocks is intended to be offset by improved wheel life.

Imagine electrification without overhead catenary (or third rail). This was commented on in the June newsletter. Three different systems are under development – by using induction cables under the track (similar to an electric toothbrush), storage batteries and capacitors.

Back with conventional rail, trains continue to get longer and heavier. BNSF, a US Class I railroad, has operated a 3,660 m long intermodal train, conveying 458 wagons, over a journey of nearly 2,000 km. This surpassed the previous record of 435 wagons for 3,050 m long. Presumably most of the route was double track. Grain trains are even longer, the same railroad having trialled a consist just short of 4,000 m in length.

Plastic sleepers are under development on both sides of the Atlantic. In the USA they are being actively marketed, particularly for siding and industrial applications. In Europe, a Dutch company is developing a sleeper manufactured from recycled plastic, with four steel reinforcing rods. It has a moulded base, like the sole of a shoe, to provide greater lateral resistance, and a trough on top of the sleeper which is filled with ballast to increase mass. Design life is intended to be 40 years. Here in Australia, bridge transoms manufactured from composite materials have been trialled.

Finally, in the field of track geometry recording, unattended systems designed for mounting in conventional revenue-earning trains are under development in the UK. Data is transmitted back to a central location for analysis.

These representative examples from around the world complement what we heard and saw at the last Chapter meeting. It is good to know that innovation in the rail industry is proceeding on many fronts. **Duncan McLeod**

National Train Communications System – Mike Van de Worp, ARTC

The slides from this presentation can be seen on the following pages:

ARTC National Train Communications System
Presented by - Mike van de Worp

16/09/2009 1

ARTC Who is ARTC?

The Australian Rail Corporation is a Federal Government corporation created to ensure rail is an integral, sustainable element of the nation's transport logistics network




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ARTC Who is ARTC?

We will, in collaboration with our customers, through innovative and creative strategies, expand the industry, provide efficient access, and enhance the national transport logistics network





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ARTC Who is ARTC?


ARTC either leases or owns the defined interstate rail network between Kalgoorlie, Melbourne, Sydney and the Queensland border and also manages the NSW government regional rail network, providing train paths for independent train operating companies

ARTC took control of the NSW country rail network in September 2004

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ARTC



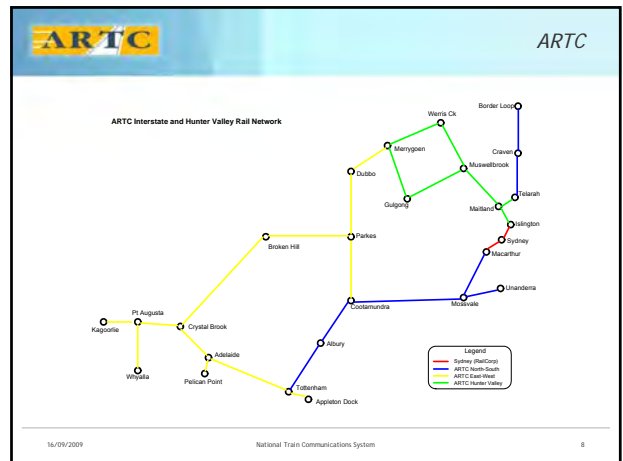
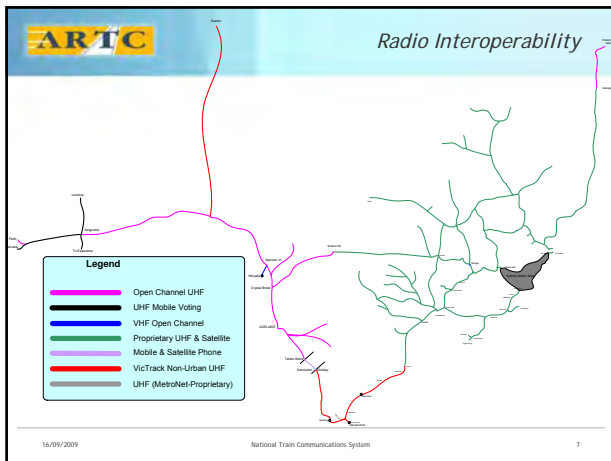
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ARTC Purpose

NTCS project Overview

- Project Background
- NTCS overview
- Telstra
- ICE - Overview
- Timings
- Transition

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ARTC NTCS project overview

Project Overview

- Provide a single platform for a complete coverage for rail communications, including Interstate and Hunter Valley Rail networks
- Installing VCS equipment in ARTC's Mile End TCC
- Upgrade the VCS equipment at Broadmeadow, Junee and RailCorp's Sydney TCC
- Provide a data network with high bandwidth and minimal latency

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ARTC NTCS project overview

Project Overview cont....

- Telstra's 3G850 is the primary transmission platform for voice and data
- Iridium Satellite provides the secondary communications media
- Integrated and modular In-Train Communications Equipment (ICE)
- Over-the-air ICE software and data updates
- Self monitoring of solution performance
- SLAs as a commitment as part of a managed service framework
- Decommission the legacy radio systems

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ARTC's Existing Train Radio Systems

- Inherited from the various state-based organisations
- Limited compatibility or interoperability
- Generally obsolete
- Little/no data capability
- Are a barrier to new entrants and efficient train operations

An example: CountryNet (NSW):

- Optus has ceased manufacturing & support for MobileSat units
- MobileSat parts becoming very difficult to source
- UHF equipment not available for over 10 years
- UHF network not supported past Oct 09
- Functionality not available to support data-centric train operations




ARTC-Telstra Contract

- Design and Construct of additional 78 3G850 sites
- Maintenance of 3G850 infrastructure over 8 years
- Supply and mgt of voice and data connectivity network
- Systems integration for networks providing comms from TCC to Locomotives
- Supply, design integration of Message switch at Telstra's hosting facilities
- Design and manufacture 704 (In-Cabin Equipment) ICE units
- Project Management
- 24 x 7 Help Desk Service

ARTC *Telstra Towers*

3G850 Network

- 3G850 has been deployed to more than 6000 radio sites nationally,
- Along ARTC's rail networks, around 700 existing Telstra Mobile sites have been upgraded to 3G850
- Rail is already benefiting from Telstra's upgrade path for 3G850:
 - Mar 07: Simultaneous voice & data via common handset
 - 2009: current data speeds to 21Mbps
 - 2009: last qtr progressing to 40Mbps






Yunta SA

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ARTC *Regional Breakdown of Base Stations*

SA

- 40 sites in total
- 40 Greenfield Macro
 - 5 Greenfield Macro private land (Adelaide /Broken hill)
 - 1 ODU (outdoor Unit) 1 Macro ARTC land (Adelaide -Melbourne)
 - 33 site for Nullarbor
- Nullarbor
 - 2 Telstra existing sites
 - 8 powered full macro
 - 23 Solar solutions (micro)

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ARTC *Regional Breakdown of Base Stations*

NSW

- 29 sites in total
- 11 Tunnels
 - (9 repeaters, 1 micro, 2 macro)
- 17 Greenfield Macro
 - (1 existing Telstra site, 1 CCI (Crown Castle International) co-locate)
 - (5 ARTC land, 10 private land)




Micro Repeater

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ARTC *Regional Breakdown of Base Stations*




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ARTC



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ARTC *Regional Breakdown of Base Stations*



WA

- 5 sites
 - 1 existing Telstra site
 - 4 sites on West Rail Land/facilities
 - 1 Macro, 4 Micro,
- Kooyanobbing is a integrated Telstra Site
- Jimperding Hill (Cobblers Pool)
- Moondyne
- Darrine Siding
- Wallaroo

Telstra is scheduling to completion these sites Mid 2009

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ARTC *NextG™ Coverage Surveys*

Heritage Motor-Rail used for several corridor surveys

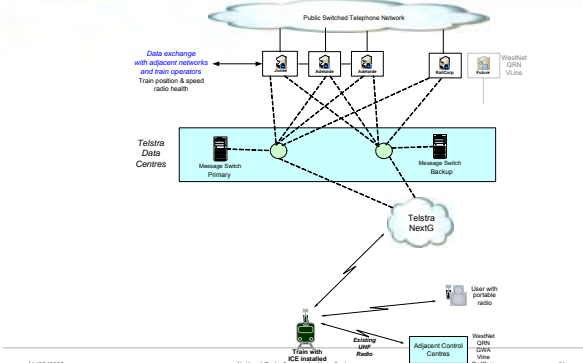
The Rail Motor, a HPC402 was made in 1936, is 16. metres in length, weighs 34 Tonnes and is still going strong.

Relative comfort of the Motor-Rail versus the setup in a Pacific National NR class locomotive



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ARTC *NTCS Architecture*



Public Switched Telephone Network

Data exchange with adjacent networks and train operators
Train position & speed
radio health

Weather GPS V-Line

Telstra Data Centres
Message Switch Primary
Message Switch Backup

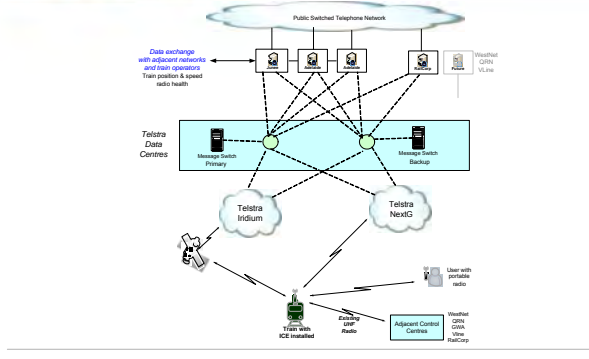
Telstra NextG

User with portable radio

Weather GPS V-Line
Adjacent Control Centres
RailCorp

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ARTC *NTCS Architecture*



Public Switched Telephone Network

Data exchange with adjacent networks and train operators
Train position & speed
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Telstra Data Centres
Message Switch Primary
Message Switch Backup

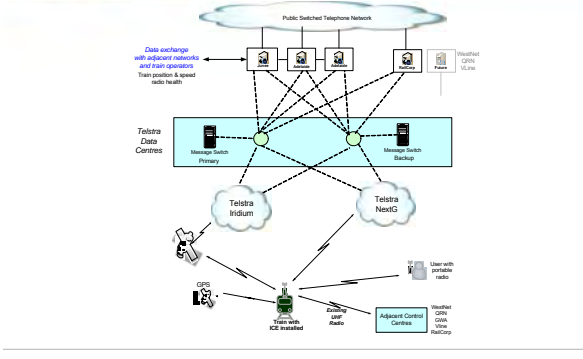
Telstra Iridium
Telstra NextG

User with portable radio

Weather GPS V-Line
Adjacent Control Centres
RailCorp

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ARTC *NTCS Architecture*



Public Switched Telephone Network

Data exchange with adjacent networks and train operators
Train position & speed
radio health

Weather GPS V-Line

Telstra Data Centres
Message Switch Primary
Message Switch Backup

Telstra Iridium
Telstra NextG

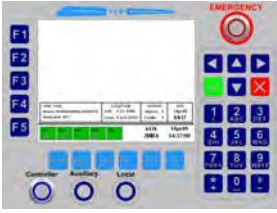
User with portable radio

Weather GPS V-Line
Adjacent Control Centres
RailCorp

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ARTC *ICE overview - HMI*

- Integrated and Redundant driver communications via one common machine interface
- Emergency and Routine Controller buttons
- DIR: stored directories for Controller, Signaller and Operator telephone numbers
- UHF button - to access stored UHF frequencies up to 255 channels
- High resolution LCD Screen



ICE Front Panel

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ARTC *ICE Pilot Trial Unit*

ICE HMI Front Panel



ICE HMI rear view



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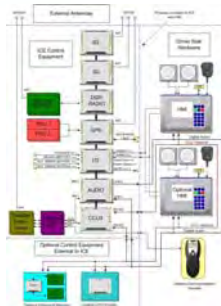
ICE Display for Recent Calls

Recent Calls			
25Aug08	14:39	Control-Call	06 8348 7878
25Aug08	14:39	Control-Call	06 8348 7878
22Aug08	17:13	Lithial Coordinators - WEST	08 8347 2468
22Aug08	13:47	Crew-Coordiators-West	06 1992 9273
22Aug08	12:45	Lithial Assistant - WEST	08 8347 8078
15Aug08	12:20	Emergency Call	000
12Aug08	14:04	Loco Defrota Adelaide	85 0630 8487
12Aug08	11:40	Loco Defrota Adelaide	85 0630 8487



ICE CCU Enclosure

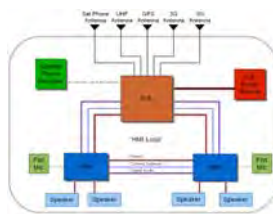
- Dual Telstra NextG™ module (supports simultaneous voice and data)
- Iridium Satellite transceiver
- Iridium Satellite handset
- CCU3 communications processor
- Multi Frequency 25W UHF Radio
- Dual Redundant Power supply
- GPS module
- I/O Module with spare I/O ports for expandability
- GSM-R Module
- Work in harsh environments (-10 to +70°C)



ICE Components



- Self test procedure & software/data update occurs on power-on
- ICE Operator data remotely configurable via secure internet connection
- Segmentation of usage costs between operation on ARTC and non-ARTC networks
- Second 3G850 SIM available could be used for operator voice & data
- Each ICE supports up to 4 HMIs
- Supports text Train Orders (ASW Victoria)
- Train data: train position & speed
- Capable to support other operator telemetry applications



ICE Schematic

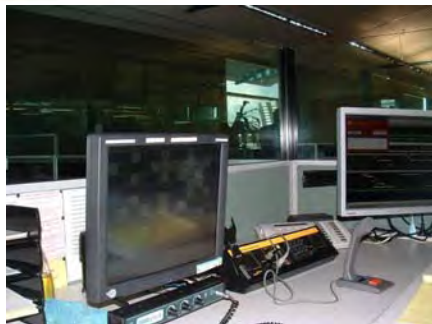
- ICE Power Supply Unit (PSU) completed
- 2 ICE Test Units (24V) supplied 21 July
- Alternate Safe Working interoperability software testing completed
- 3 ICE Pilot Units (74V) due Sept 8 for Hunter Valley Pilot
- 71 NextG™ sites west to Kalgoorlie completed
- All NextG™ sites (75) will be completed Sept
- 11 of 13 corridors initially surveyed for carriage.



Wirrappa Solar Array



72Vdc Pilot version



ARTC VCS Display - Controller View

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ARTC

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ARTC Timings

- 2005 - 2006:
 - Develop Train Radio Specification
 - Consultation with Network owners, Operators and Regulators
 - Development of a Project Risk Register (Melbourne Workshop)
- 2007:
 - Apr: Contract Signed with Telstra
 - Jun: First two 3G850 base stations commissioned
 - Jul: ICE System Requirements, ICE Physical Specification,
 - Aug-Dec: Commissioning of further 3G850 base stations, ICE HMI Prototype, detailed design
 - Dec: ICE Message Switch commissioned
- 2008:
 - Further commissioning of 3G850 base stations
 - Upgrade Junee & Broadmeadow TCC VCS equipment
 - Install VCS equipment into Mike End TCC
- 2009:
 - Complete VCS equipment upgrade and configuration
 - ICE Pilot (Hunter Valley / East West)
 - Complete commissioning of 78 3G850 base stations
- 2010
 - ICE Locomotive Installations commence ICE Manufacture completed
 - ARTC close legacy train radio networks

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ARTC Train Location Systems

Train No:	14127
Loco No:	0010
Service:	
Speed:	11.0
Run Position:	0
Track No:	1
GPS Time:	20090207 17:02:09
vs Timetable:	
No. Wagons:	
Green Tones:	

The TLS application is a secure application showing train information sent from the ICE unit overlaid onto a map showing

- Train ID
- NextG and Satellite numbers
- Train Lat / Long information

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ARTC Train Location System

- ICE-equipped trains will be tracked across all SG networks
- TLS provided to train operators and adjacent Network Authorities
- Accessible via internet

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ARTC Legacy Radio Systems

- Transition Period
 - 12 month Transition
- End of Transition
 - Extend the Transition Period
 - Proceed with Decommissioning
 - Partial Decommissioning

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