OPEN NETWORKS USAGE FOR RAILWAY SYSTEMS

Derel Wust
Managing Director,
4Tel Pty Ltd
My Background

• I live in Queensland, Australia
• I own a company that builds, deploys and maintains systems using interoperable methods
  – Will share our experience in developing interoperable systems for specific rail use, including safety applications
  – Will briefly talk about GSM-R in Australia
  – Also about the use of public mobile telephone networks for train radio
Train Radio Systems

- Private GSM-R systems for capital cities
- Public mobile system for the Interstate Network, using Telstra NextG (3G)
- UHF-FM narrowband radio as a common mode
GSM-R/Spectrum Status

AUSTRALIA

AUSTRALIAN RAILWAY ASSOCIATION INC

LEGEND

NARROW GAUGE
STANDARD GAUGE
BROAD GAUGE
SERVICE SUSPENDED
INTERSTATE STANDARD GAUGE NETWORK

Aust-wide 5 Mhz

15 Mhz

15 Mhz

15 Mhz

15 Mhz

15 Mhz

NEW ZEALAND
The Australian Rail Track Corporation (ARTC) created as a result of the Commonwealth and mainland State Governments Inter-Government Agreement in 1997.

Tasked to establish a 'one-stop-shop' for rail operators seeking access to the interstate standard gauge rail network between Brisbane and Perth.

Commenced operations on 1 July 1998.
Extra TELSTRA 3G Sites

Some 90 ‘rail’ sites installed
Interoperability Versus Harmonisation

• Harmonisation
  – The preferred railway systems approach
  – ‘One way’ lowers standardisation and deployment risks
  – BUT creates monopoly rents and stifles innovation on new ways of doing things

• Interoperability
  – Is demanding on standards & certification
  – BUT allows trade-offs & innovation
OUR EXPERIENCE IN OPEN SYSTEMS
ON THE NSW COUNTRY REGIONAL NETWORK (CRN)

A new train control centre in Australia commissioned
January 2012
Country Regional Network (CRN)

The NSW Government has contracted JHR to operate and maintain the CRN for 10 years – all fully outsourced.

4TEL has the technology Design, Construct and Maintenance (DCM) role for the Network Control Centre.

Train Order Working – 2,246km

Rail Vehicle Detection – 160km
Monitoring Infrastructure

Can monitor any infrastructure or mobile device for operating data
Tracking Trains, Vehicles and Staff

Web Browser View

IPhone View

4 September, 2013
Use “Best of the Internet”

• The Internet and mobile telephone networks are the biggest open networks on Earth and they are not Harmonised
  • Exploit the $Billions invested into public networks to select technologies of use to rail operations
  • Use defined interface methods – “Interoperability”
  • Allow integration of multiple sources of data
  • But needs different skill-sets to normal rail skills

• Operate on the secure side of firewalls to manage security
Interoperability in Open Systems

• Three core elements are needed to achieve interoperability between systems:
  – Defined network connection methodology
  – Defined methodology for describing data consistently
  – Defined methodology for achieving security and operational integrity
Defined Network Connection Methodology
Defining the Interfaces

THE 7 LAYERS OF OSI

- Digital systems work differently
- Safety is an app issue; not media or host!!
- Interfaces between Layers in a system
- Protocols between same Layers
- The Internet uses Open Systems standards

Interoperability is achieved via network connection interfaces
IP Network for the CRN
Defined Methodology for Describing Data Consistently
Define the Data

• All rail operations require similar data
  – Core data can be defined
  – A process to allow user specific data can also be defined
• Use an interface process to separate applications, from data, from networks
• Well proven Internet methods exist
Standardise Interfaces, not Systems

Proprietary Systems allow innovation to improve services & value-for-money

Harmonised Systems can stifle innovation & create monopoly rents
Interoperable Data on the CRN

Train Position Messages

- GSM-R
- GPS satellites
- Optus S2 Satellite Network
- Public Mobile 3G

Adjacent Operators Positioning Data

Train with modern communications
Train with legacy communications

Timetable Tracking System
Location Tracking System
Train Orders Control System
Train Radio Communication System
Defined Methodology for Achieving Application Security
Use Banking Methodology

BANK Example

Applied to RAIL
Safety is managed in the Application

XML & SOAP

Public/Private IP Network

VPN

for Train Control

Define message delivery protocol


Interoperability in Open Systems

• Three core elements are needed to achieve interoperability between systems:
  – Methodology for network connections
  – Methodology for describing data
  – Methodology for achieving security and operational integrity

• Interoperability is **NOT** Harmonisation

• The rail industry needs to invest in interoperability skills development
For more information:

Mr Derel Wust
Managing Director
+61 402 460 349
dwust@4tel.com.au
www.4tel.com.au