Worldwide trends in train control

Jared Haube for Train Control

With new railway expansions occurring across the world, train control technology and management systems are coming to the forefront as strategic assets to solve capacity requirements, operational efficiencies and cost effectiveness.

Great Britain, France and Australia are three countries in which such expansions are occurring. The development of Rail Operations Centres reflect the critical need for consolidation of disparate network technologies.

Rail Operations Centres (ROCs)

Network Rail

Running a national railway network is a gigantic task for any organisation, and Network Rail has its own set of unique challenges:

1. Every year, passenger and freight traffic increases and it is predicted that by 2020 there will be 400 million more passenger journeys and an increase of 30% in freight. This will result in many of the major rail routes exceeding current capacity.
2. The challenge of operational costs falls under efficiency. At this point in time, it's a very expensive undertaking for Network Rail to manage its existing infrastructure and provide paths to run the trains.
3. Change management and transition of people is often overshadowed by a strong focus on technology in the organisation. The bigger challenges come from changes required to the way people use the technology; therefore more time and energy needs to be focused on communication, change and stakeholder management.
4. Network accessibility is severely limited due to seven-days-a-week operation of the railway; it only shuts down on Christmas Day.
5. Network Rail looks after the tracks, signals and timetables nationally, but the government has roughly 30 franchise operators that oversee passenger and freight services individually. Any attempts to close parts of the network would impact on franchise revenues.
6. Legacy systems are still in operation and have been maintained over many years. There's a need to modernise a complete mixture of signalling and IT technology, such as the oldest signal box (mechanical lever framed) still operating since the 1860s.

These challenges define the core business problems, and consolidation is coming into effect on a major scale.

Ian Barnes, Programme Manager, Network Operations, has noted that "Over the next 15-20 years we will close down around 800 existing centres across Great Britain and control the network from 12 ROCs."

Constructed ROC in Great Britain

Réseau Ferré de France

France currently has 1500 signal boxes in operation across 14000 km of the main network (representing 90% of the traffic). The mixture of signalling technology in France reflects the impact of legacy systems that have been maintained over many years:


Mechanical signal box


Electric (push button) signal box


Computerised signal box

Sylvie Lesueur, former Deputy Manager for the Signalling and Rail Operations Centre (ROC) Department, was directly involved in the project early on.

"We had to build a business case to support the project's feasibility. That involved extensive review of all signal boxes on the network. The idea was to consolidate the command of all signal boxes into 16 ROCs to improve train operation management. In 2007 we had 75 million Euros per year to renew signal boxes." she said.


Bourgogne Franche Comté Rail Operation Center in Dijon, Burgundy

After embarking on the ROC project, investment was raised to 340 million Euros in 2013 (with intentions to reach a target of 400 million). The increased scope of this project meant ensuring that there was enough manpower to support the required amount of work.

"The ROC project in which I was involved was part of a current initiative to consolidate these 1500 operating locations (signal boxes) into 16 rail operations centres, in order to have a more efficient and economical organisation for managing train movements. It started with an issue of ageing signal equipment and led to a train traffic management project," Sylvie said.

RFF recently put in service a new ROC in the Lorraine region at Pagny-sur-Moselle and one in the Rhône Alpes region in Lyon (both in 2010). In a ROC, each traffic operator commands a traffic section that comprises up to a dozen signal boxes.

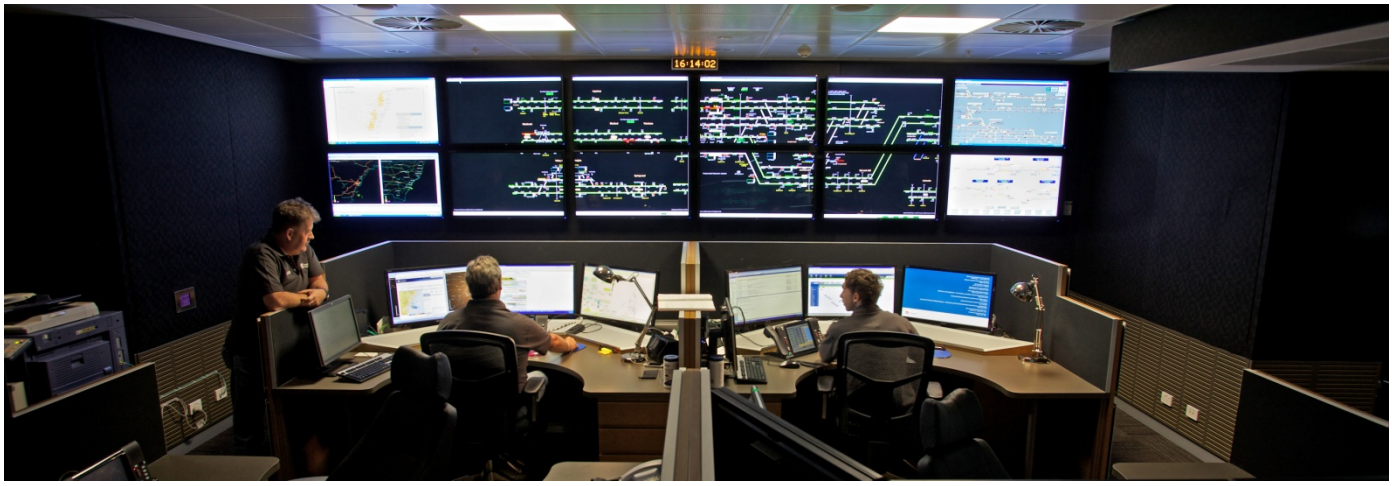
RFF expects 60% of the project to be rolled out by 2032. At this time 14 rail operations centres will be completed with a total of 148 traffic section (out of 256) remote controlled from these ROCs. Development of all 16 rail operations centres will be completed by 2050.

Sydney Trains

A business case under way to develop a new rail operations centre known as the *ROC.* This will bring together all the expertise within Sydney Trains from the operations, maintenance, security and customer service divisions.

Tony Eid, Director of Operations at Sydney Trains, has stated that "The centre will be built at a greenfield site. The business case is expected to be completed by Christmas 2013, but we're still in the initial planning and development stages."

More recently, Maintenance operations at Sydney Trains have entered a new frontier in New South Wales, through the consolidation of six former control centres around the state into one Infrastructure Control Centre, appropriately named *ICON* and located in the heart of Sydney Central Station.



Inside ICON

Comprising 70 staff, ICON provides 'round-the-clock service during major incidents and support customer service managers through one streamlined point of contact.

The Maintenance Directorate previously had six control centres provide the 24/7 support for network incidents and maintenance operations, which were effectively a product of various disciplines working independently.

Although these centres were able to manage incidents quite well, there were multiple challenges to coordination in complicated circumstances that required various groups to work together.

The lack of a single point of contact also contributed to frustrations amongst staff, especially from an operator's perspective.

ICON comprises five specialised departments:

1. Electrical Operations
2. Corridor Safety System
3. Central Control Systems
4. Infrastructure Operations
5. Rail Technology Operations

Train Control and Management Systems 2014

- Ian Barnes, Programme Manager, Network Operations at Network Rail, will provide in-depth insight into leading traffic management technology and also examine opportunities for Australia's rail networks.

- Sylvie Lesueur, former Deputy Manager for the Signalling and Rail Operations Centre (ROC) Department will conduct a workshop on: **Renewing Signal Boxes to Develop Rail Operation Centres,** providing insights into network auditing and inventory of equipment, and rolling out an operations project from a technical perspective (organisation, tools and change management)

- Tony Eid, Director of Operations at Sydney Trains at Sydney Trains, will discuss strategies to develop and enhance early warning detection systems and rapid incident response.

- Andrew Constantinou, Technical Director Control Systems Main West, will conduct a presentation into the Infrastructure Control Centre, exploring features including:

➢ Infrastructure Operations Centre: Signalling and Civil Call Centre
➢ Electrical Operations Centre: Electrical Switching and Supervision.
➢ ECRL CCS: Monitoring of ECRL Tunnel systems
➢ Rail Technology Operations Centre: Data, Voice and Telecommunications Assets
➢ Control Systems Operations Centre – Train Control and Visibility
➢ Passenger Information Operations Centre – Public Address, Passenger Information