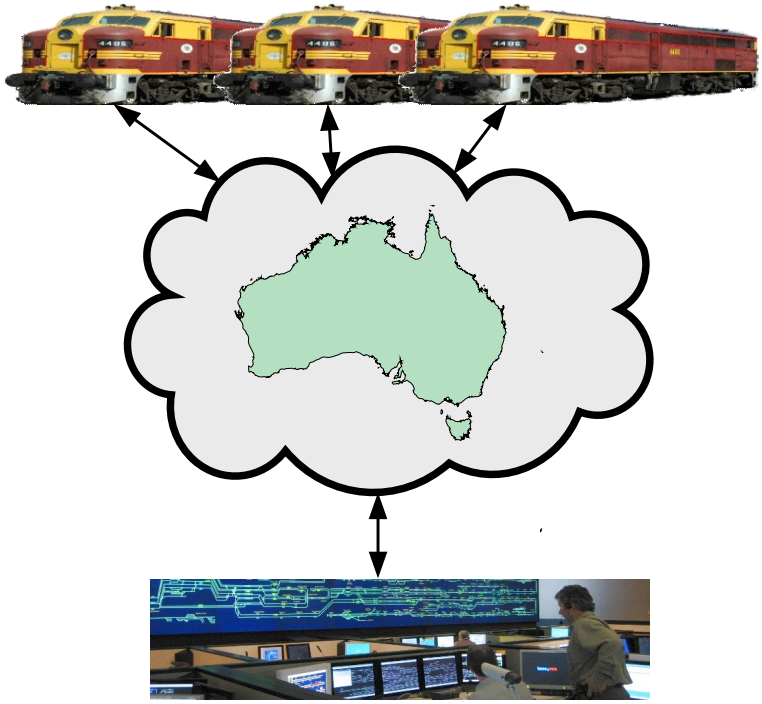
ice



National Train Communication System

base 2

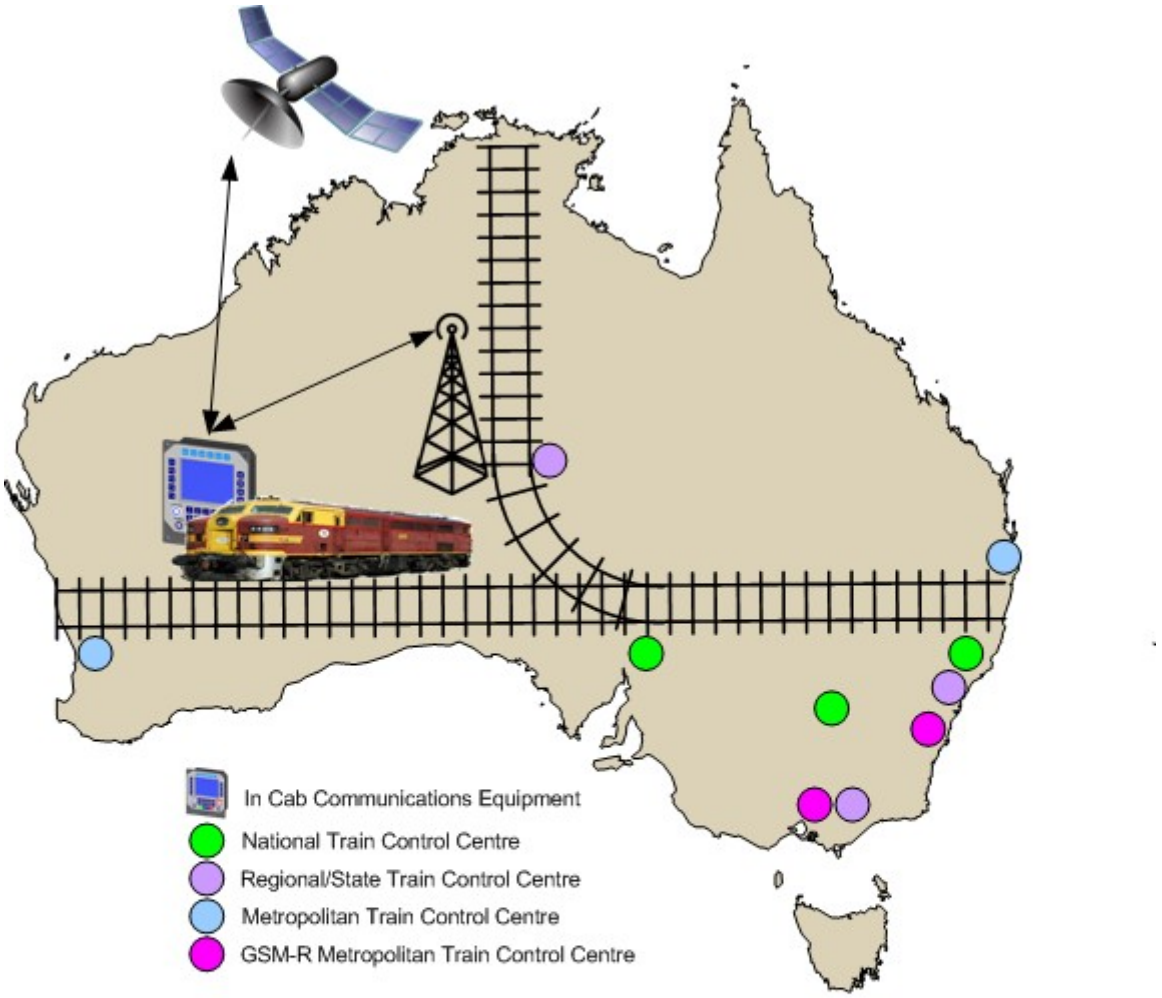


Figure 1: National Train Communications System

General

The National Train Communications System (NTCS) is used for all train control communications on the Australian Defined Interstate Rail network and selected regional areas. The premise behind the system was to modernise and standardise the aging and disparate systems scattered throughout Australia. A feature of the system is to leverage commercial communications systems such as 3G in order to minimise infrastructure costs imposed by building a railway specific network throughout an entire continent. The use of commercial networks necessitated the introduction of specific features to maintain the safety and integrity of the mission critical system.

Base2 has delivered the solution which exceeds the specification of the current design requirements and provides a turnkey solution to Rail Infrastructure projects requiring a telecommunications system with inherent safety, reliability and flexibility.

Locomotive Equipment

The In-Cab Communications Equipment (ICE) is the Locomotive installed communications hub with simultaneous multi-medium communications capability, allowing UHF, mobile phone (GSM, and UMTS with HSDPA and HSUPA protocols), Satellite and GSM-R communications from the one piece of equipment.

The ICE allows up to four driver interface units to be connected simultaneously to accommodate different cab configurations, or to allow parallel operation from two drivers.

Local communications between trains, onboard to conductors, in yards or administrative calls are integrated in the ICE. Train Control communications automatically pre-empt other non critical communications.

Remote monitoring, reporting and automatic initiation of a Railway Emergency Broadcast Event is performed through interfaces to onboard systems such as Derailment Detection and Driver Vigilance.

A variety of HMI configurations allow for installation flexibility which requires equipment to be installed in a wide variety of locomotives from heritage steam locomotives to modern passenger and freight trains.

Figure 2: HMI – The communications interface for the driver

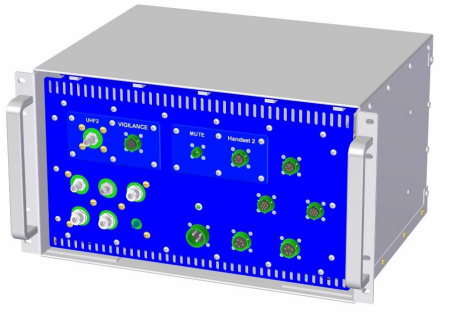


Figure 3: Communication Controller Unit Enclosure

Communication

A constant 3G data connection to the ICE allows consistent updates of locomotive position through the in-unit GPS receiver, call information, extensive logging capabilities as well as the integration of monitoring and fault detection to allow over the air configuration and updates of firmware and software. Faults are instantly reported and responsible parties are notified immediately to allow quick response times reducing costs. In the event of 3G network coverage or module failure the ICE is designed to automatically fallback to Satellite communications for both data and voice giving the assurance of total coverage.

For local communications and Train Control the ICE automatically adjusts communication parameters (ex Frequency) and medium (ex GSM-R) based on internal geofences. This provides a seamless workflow for the driver regardless of underlying networks.

ICE Communication is tied in with base2's XLG Communications Server which collects and disseminates all incoming and outgoing data to allow graphical configuration of networks and locomotives all from an easy to use GUI. A remote Console running the client for the XLG server allows reporting of faults and updates from any PC connected to the network.

Configuration and Reporting

A graphical web based configuration portal, iceGIS, gives Rail Operators the ability to enter in specialised locomotive configuration data including UHF frequency channels and phone number directories. Geofences can be used to customise behaviour across different parts of the network. Realtime and hostorical Locomotive Alarm and Fault reports are available from iceGIS.

Train Control Centre

Train Control Centres fitted with base2's VCS touch screen communications consoles (CTWS) can distribute incoming calls to Train Controllers based on a variety of criteria with priority queuing for Emergency calls and automatic conferencing of Locomotives based on location. The VCS accommodates flexible amalgamated working patterns allowing dynamic reconfiguration of Train Control boundaries for example during off-peak or weekend operations.

Migration of Legacy Systems

An important feature of the VCS is its ability to integrate a wide variety of legacy communications networks into the one system at the Control Room. This is mandatory to enable safe deployment of new network technologies and systems while being interoperable with existing legacy systems.

Interfacing to Third Party Systems

For Train Control Centres that wish realtime information on their locomotives outside the XLG reporting system, an XML server interface allows 3rd party applications to access up to date accurate information on any or specific groups of locomotives. This allows the raw data to drive systems such as Automatic Safe Working (ASW), Train Location Systems (TLS) and Collision Detection Systems. The XML data is available to Train Operators to utilise in their own Train Operations Centres. This can be used for fault reporting, or to pinpoint location of a Train in the event a technician needs to be dispatched, or for operational logistics scheduling purposes.

The base2 Train Radio solution provides an end to end product for managing multiple medium (network independent), data and voice communications. The solution is adaptive and allows the interface of 3rd party applications giving enhanced capability in any environment.

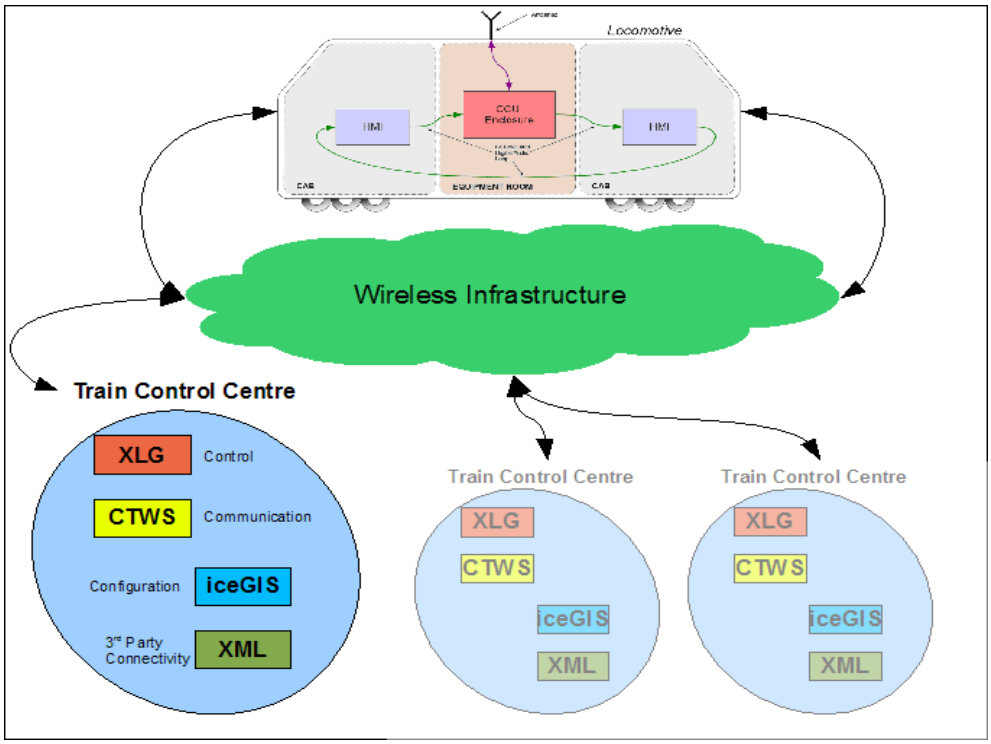


Figure 4: System Overview for NTCS Project

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