Description of Canada’s Rail Based Freight Logistics System

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Introduction

On May 30, 2007, the Government of Canada announced the introduction of a Bill, which contained improvements to the shipper protection provisions of the Canada Transportation Act. The announcement also indicated that the government would undertake a review of rail freight service.

The government has determined that the review will be conducted in two phases. Phase 1 of the review consists of research work examining a cross section of topics concerning the Canadian rail freight logistics system ranging from quantitative analysis of railway performance to the assessment of stakeholder practices and views with respect to rail service in Canada today.

This report has been prepared as part of the Phase 1 research work for the Rail Freight Service Review. The objective of this report is to describe the Canadian rail freight logistics system in Canada. In addition to describing the structural and operational elements of the Canadian rail system this report also examines the interrelationships and interdependencies of the various system components and participants.

Overview

In the 21st Century, Canada’s two Class I transcontinental railways are amongst the most profitable and by many measures the most efficient freight railways in North America. However, their current prosperity comes after a long period in the previous century which was characterized by a decline in their scale and competitiveness and by a long period of disinvestment.

Railways in Canada rebuilt their profitability and efficiency through their dominance of the long haul movement of commodity products. However, in the last decade, fueled by growing trade in commodities and manufactured goods with Asia, intermodal traffic has become the fastest growing segment of the rail freight market in North America. The growth of intermodal provides a welcome diversification of the railways’ commercial base and in partnership with ports, terminals, shipping lines and logistics companies; railway intermodal services have become a vital link in the international supply chains of many Canadian companies.

This importance of railways as enablers of commercial activity and especially of international trade makes the maintenance of their financial health an important priority for policy makers. Railways are heavily capital intensive enterprises, needing a relatively high proportion of their operating income to fund ongoing capital investment (railways share this characteristic with some of their biggest customers – particularly the mining industry). Over the last several years, railways have achieved profitability that would seem to ensure their ongoing financial viability.

Railways, due to the natural barriers to entry of competitors in many of their transportation markets, enjoy a degree of market power and therefore economic regulation of the industry includes a number of shipper protection measures in the Canada Transportation Act (CTA) which are designed to protect shippers from railways
unlimited exercise of this power. These measures include: interswitching, final offer arbitration, competitive line rates, and a level of service complaint process. In addition, the CTA requires railways to provide “adequate and suitable accommodation” for traffic offered for movement and requires that traffic be moved “without delay, and with due care and diligence.” The adequacy of these shipper protection measures and the ability of railways to use their market power in ways that disadvantage shippers is a major concern of Canadian rail shippers. In 2001, the Canada Transportation Act Review panel (CTAR panel) assessed the level of competition in the Canadian freight rail market. At that time the CTAR panel concluded that Canada’s rail system did not seem anti-competitive and that there was no systemic abuse of market power by railways. However, since that time, some of the indicators that the panel used in their determination (railway rates and profitability) have changed such that they may not provide unconditional support to the conclusions on railway market power that were reached in 2001.

This report provides an introduction to the basic services provided by railways to shippers including: carload, intermodal and unit train services. It also provides a high level description of the key processes that railways use to plan and deliver these services including:

- Train planning and design
- Locomotive and rail car equipment
- Rail car order and distribution processes
- Railway shipment transaction processes
- Railway terminals and infrastructure
- Rail traffic control and interchange processes

For all of these physical facilities and operational processes only the most elementary descriptions are provided. A detailed description of railways’ complex systems and processes for managing their operations would be well beyond the scope of this descriptive report. However, one key lesson that can be learned from the information provided is that railways’ service levels are in part constrained by the nature of railway infrastructure. Rail cars require locomotive power to move and they cannot be moved except between rails. In our report, these two obvious and simple statements are emphasized as they explain the key limitations on a railway in the management of traffic to meet customer needs. As we note in this report, when cars are assembled in blocks and then into trains they can move efficiently according to the plan that placed them in these blocks. However, when an individual car falls behind schedule there are few meaningful opportunities for railways to recover the performance of that car.
Railway - Customer Interfaces

The Canadian rail freight logistics system is large and complex with CN and CP operating nearly 1,000 trains per day that serve hundreds of customers. Delivering effective rail transportation services to shippers, receivers, ports and terminals requires the planning, scheduling and management of approximately 2,000 train crews, 3,000 locomotives, and 200,000 rail cars across CN and CP’s networks each day. In addition to managing their own networks the railways must also coordinate their operations with other railways, including some 49 short line operators, in the interchange of an estimated 10,000 rail cars per day.

Recognizing the magnitude and complexity of the rail system in Canada this report gives special emphasis to the importance of the interface processes between railways and their customers in the efficient operation of the Canadian freight rail logistics system. The operations of railways, shippers and receivers are interdependent, necessitating a high degree of collaboration if the system is to operate efficiently in the interests of all stakeholders. Shipper, terminal and railway operations are co-dependent and failures in effective communication between the partners will result in increased costs and inefficient operations for all partners in the system.

Where Problems Can Occur

Ineffective communication processes and a lack of collaboration between system partners can and does lead to problems within the rail system that can affect the operations of both railways and their customers. In the area of communications; railways and their partner stakeholders have a shared interest in the continued development of a railway logistics system that provides accurate planning and operational information to all partners.

Origin

At origin problems generally revolve around the delivery of rail cars to shippers for loading. Problems can arise with respect to the supply of a sufficient number of cars to meet shipper demand or the timeliness of railway service to coordinate with shipper operations and shipper market commitments. Such failures can be the result of breakdowns in railway or customer planning and operating processes, ineffective communication between shippers and railways, the actions of other shippers using shared railway services or broader network issues.

In Transit

Once a shipper releases a rail car to the railway, or in the case of intermodal once the container is delivered to the terminal, the railway assumes full control of the shipment and will control how it moves the shipment to destination. The railway’s objective will be to maximize the efficiency of its assets while meeting customer expectations or contractual commitments for service.

While shipments are en route, one important area of communication involves the provision of a shipment’s estimated time of arrival at destination by the railway. This information is used by receivers to plan their rail car unloading operations which in many instances have to be coordinated with other on site operations or logistics.
activities. If railway communication is not timely or the information is inaccurate it can lead to problems for receivers and directly impact other elements of the logistics chain. The effectiveness of railway communication in this area becomes particularly important in times of disruption when normal shipping patterns and other elements of an integrated logistics chain - such as vessel scheduling and loading for bulk products - must adjust to the rail service disruption.

**At Destination**

As at origin problems at destination center on the timely delivery of rail cars to customer facilities – in this instance loaded cars for unloading. Railway – customer interfaces at destination focus on notification regarding the availability of traffic and planning for final placement of rail cars at receiver facilities. A significant challenge faced by the railways at some destination terminals such as Vancouver, is the need to coordinate the delivery of trainload lots to bulk and container terminal operators as well as individual carloads to a large number of individual receivers.

Effective communication and planning processes between the railways and terminal operators are particularly important. The large lot sizes associated with bulk commodities combined with capacity constraints for both the railway and the terminal operator provide limited room for error. For the railway, train operations must be coordinated with receiving terminals to avoid the staging of customer traffic for extended periods in rail yards or elsewhere on-line. This ensures that railway assets are used effectively and congestion, which can cause delays to all traffic and increase operating costs, is minimized. For a terminal operator the timely arrival of trains in the proper sequence minimizes potential disruption to inventory management or ship loading activities. For container terminals, who act as the interface point between shipping lines and railways, effective communication and planning processes help to achieve efficient terminal throughput of containers minimizing the risk of port terminal congestion. This is particularly important at Vancouver where a high proportion of the terminals’ throughput is picked up and delivered to the terminal directly by the railways, and where the terminals have a relatively small footprint relative to their throughput.

**Impacts**

Failures within the rail logistics system will impact both railways and their customers. Service failures at origin, apart from delaying rail car loading and shipping activities, can negatively impact on site plant operations by requiring the rescheduling of customer operations and inventory management processes. This rescheduling can affect the safety of operations on customer sites if the movement of rail cars on shipper property must be coordinated with the on-site activities of the shipper. Additionally delays to rail shipments can, depending on the nature of the specific supply chain, result in negative impacts on downstream logistics processes such as transloading, inventory management, and vessel scheduling and loading. Moreover frequent or systemic service failures that affect the reliability of service can also impact a shipper’s ability to market his or her product.
For railways, customers’ failure to properly communicate their demand requirements and to perform rail car loading and unloading activities efficiently can add to the congestion on railways, particularly at destination terminals. When customers do not coordinate rail car shipments to their facilities to match their loading or unloading capacity or planning, they create the requirement for railways to stage this traffic, which adds to railway congestion. This congestion can reduce railways’ effective capacity and can impair their ability to provide service to other customers.
1. Railway Industry Overview

1.1 Early Developments

The North American railway network of the 21st century is the product of almost two hundred years of continuous evolution. Although the system is rooted in the technological advances that came with 19th century industrialization, it became an important instrument in nation-building and economic expansion in Canada and the United States.

The first public railway in Canada, the Champlain and St. Lawrence Railroad, opened for business in 1836. This steam-powered railway was designed principally to supplement and bridge gaps in Canada’s river and lake transport systems. Canada’s early railways were often seasonal operations that provided a means of speeding up the transfer of passengers or cargo between transshipment points. Others, such as the Albion Railway in Nova Scotia, and the Chemin de fer de l’Industrie in Quebec, served as resource or mining railways in the movement of coal and other minerals.

The pace of railway development in Canada in the first half of the nineteenth century was slowed by a lack of adequate funding. The late 1800s saw railway development in Canada move forward as a direct result of government involvement. The British North America Act of 1867 contained a specific reference to the new federal government’s responsibility to physically connect Nova Scotia, New Brunswick, Quebec and Ontario by rail. This

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was achieved by constructing the Intercolonial Railway of Canada, which connected Halifax and much of Atlantic Canada with Quebec and Ontario resulting in a railway network consisting of approximately 4,800 miles of track situated almost entirely in the eastern part of the country. As Figure 1 above shows the majority of the Canadian railway network was in place by the end of the 1920s consisting effectively of two transcontinental systems, largely running in parallel with each other, throughout much of the country.

Although there would be continued expansion during the four decades that followed, the rate of growth was nominal by comparison. Notable expansions to the Canadian system from the 1930s onward included:

1921 - 1952  Construction of the Pacific Great Eastern Railway connecting Vancouver with CN at Prince George, B.C. The railway became a provincially owned crown corporation in 1918 and was renamed BC Rail in 1984. It was Canada's third largest railway until its sale to CN in 2004.

1929  Joint acquisition by CN and CP of the Northern Alberta Railways. CN subsequently purchased CP's ownership interest in 1981.

1929  The opening of the Hudson Bay Railway extending from The Pas to Churchill, Manitoba. The railway was originally operated by CN on behalf of the federal government until it was formally taken over by CN in 1951.

1932  The expansion of the Temiskaming and Northern Ontario Railway from Cochrane to Moosonee, Ontario which supported the development of the mining and pulp and paper industries in the province's northern region. Owned by the Ontario government it was renamed the Ontario Northland Railway in 1946.

1949  Concurrent with Newfoundland's entry into Confederation in 1949 the amalgamation of the Newfoundland Railway with the operations of CN.

1954  Construction of the Quebec, North Shore and Labrador Railway to support the development of the iron ore mining industry in Quebec and Labrador.

1964  Opening of the Great Slave Lake Railway extending from the Peace River area of Alberta to Hay River in the Northwest Territories. The railway was operated by CN on behalf of the federal government until 1996 when its operations were merged with those of CN.

1.11 Canadian Pacific Railway

The Canadian Pacific Railway Company was incorporated on 16 February 1881 and charged with completing the work on the transcontinental railway that the federal government had initiated a decade earlier. Completed in 1885, regular train service between the company's eastern terminus in Montreal and its western terminus in Port Moody, British Columbia was initiated in 1886.

Prior to its westward expansion the CPR first established a presence in eastern Canada through the acquisition of several existing rail lines including the Canada Central Railway in 1881 and the Quebec, Montreal, Ottawa and
Occidental Railway in 1882. Using the independently chartered Ontario and Quebec Railway as its base the company moved to construct what would become its main line through southern Ontario, acquiring the Toronto, Grey and Bruce Railway as well as the Credit Valley Railway among others, many of which would subsequently be integrated into the Ontario and Quebec Railway.

Following the completion of construction of its transcontinental route the CPR continued to expand in both eastern and western Canada through a combination of new construction and the purchase or lease of existing railways. In eastern Canada the railway extended its network eastwards from Montreal, across the state of Maine, to Saint John by 1889. It also extended its reach throughout southern Ontario, establishing connections with the developing United States railway network in the process. In western Canada CP developed a network of branch lines across the Prairies as well as constructing a second route through the Rockies and into the British Columbia interior.

In the late 1880s, the railway gained control of several railways in the US Midwest including the Minneapolis, Sault Ste. Marie and Atlantic Railway which it then merged with others to form the Minneapolis, St. Paul and Sault Ste. Marie Railway - the precursor to its current day Soo Line Railroad subsidiary. For much of the company’s history, the CPR’s trans-border operations have been centered on this network that connected its Canadian lines with Chicago via Minneapolis using two border crossings at Emerson, Manitoba, and at North Portal, Saskatchewan.

By the outbreak of the First World War, the CPR had largely completed construction of the network that it would continue to use for almost another century. Although the company remained heavily focused on its railway operations, it also diversified its business holdings through investments in the hotel, shipping, real estate, energy and airline sectors. The growth in these operations resulted in the company being reorganized in 1971, with the railway recast as a subsidiary of a new parent company, Canadian Pacific Ltd. In October 2001 the railway once again became an independent company when it and four other subsidiary companies were spun off under CP Limited’s so-called “Starburst” strategy.²

In 1985 the railway, through its Soo Line Railroad subsidiary³, purchased the bankrupt Milwaukee Road, extending its reach into the Louisville and Kansas City areas. However, the company later sold most of its lines in Wisconsin and northern Michigan, along with its Kansas City and Louisville lines and branch lines in North Dakota and Montana to emerging U.S. short line railways. These included the lines sold to form the Wisconsin Central Transportation Corporation in 1987.⁴

² The other four Canadian Pacific subsidiary companies spun off at this time included CP Ships, PanCanadian Energy, Fairmont Hotels and Resorts, and Fording Coal.
³ Prior to 1990 the CPR had a controlling interest of 56% in the Soo Line Railroad. In 1990 the company acquired full ownership of the SOO Line. Although it technically remains a subsidiary corporation it is now operated as part of the CPR system.
⁴ The Wisconsin Central Transportation Corporation would be acquired by the Canadian National Railway Company in 2001.
The 1990s were a significant period of structural change for the Canadian Pacific Railway network in both eastern Canada and the United States. South of the border CP further expanded its U.S. railway holdings by purchasing the bankrupt Delaware and Hudson Railway (D&H).

During the early 1990s CN and CP discussed a range of options to rationalize their respective eastern networks including a merger of the two networks and proposals by each carrier to purchase the assets of the other. Ultimately these scenarios did not prove viable and CP proceeded over a number of years to rationalize its entire eastern network including all of its lines east of Montreal, with the routes operating across Maine and New Brunswick to the port of Saint John (operating as the Canadian Atlantic Railway) being sold or abandoned.

In 1995 CP relocated its headquarters from Montreal to Calgary, AB.

1.12 Canadian National Railway

The Canadian National Railway Company had its beginnings in 1918 when the name was employed as a means of referring to the collective operations of the railways that had by then come under the control of the Canadian government. These encompassed the holdings of what were then known as the Canadian Government Railways (CGR) as well as the newly nationalized Canadian Northern Railway (CNoR) which had by this time assumed management responsibility for the CGR. Although the CNR had been incorporated as a federal Crown corporation in 1919 the CNoR and CGR continued to exist as legally separate entities. These holdings were subsequently enlarged to include the nationalized operations of the Grand Trunk Pacific Railway in 1920, followed by its parent, the Grand Trunk Railway, in 1923. The operations of the Canadian Northern Railway, the Canadian Government Railways, the Grand Trunk Pacific Railway and the Grand Trunk Railway were formally merged into the Canadian National Railway Company on 30 January 1923.

In the fifty years that followed its formation, the company was enlarged to include the operations of several other railways. These included a takeover of the Northern Alberta Railways, an expansion of the Hudson Bay Railway, the transfer of the Newfoundland Railway, and the construction of both the Great Slave Lake Railway and the Alberta Resources Railway. The addition of these operations effectively served to increase the company’s network to about 25,000 route-miles by the early 1970s.

Much as Canadian Pacific had done, the company ventured into several non-rail related businesses. In addition to its hotels, which evolved from the passenger train operations of its predecessors, the company operated coastal marine services, trucking operations and was involved in the telecommunications, broadcasting and airline industries. Beginning in the mid 1970s, as part of the federal government’s recapitalization strategy the company began to divest itself of its non freight railway operations.

The expansion of CN’s Canadian railway network in the 1970s and 1980s was matched to a lesser degree by the restructuring of its holdings in the United States, which essentially comprised three railways: the Grand Trunk Western Railroad; the Central Vermont Railway; and the Duluth, Winnipeg and Pacific Railway. In 1970, these
were grouped together under a CN subsidiary named the Grand Trunk Corporation, which has effectively been regarded as a Class I carrier in its own right by US regulatory authorities.

In the early 1990s, the Government of Canada decided to privatize the company. In preparation for this, the company moved to significantly enhance productivity by making reductions to its network as well as its workforce. This included the sale of its Central Vermont subsidiary and the integration of its remaining American operations within in a more unified system.\(^5\)

### 1.2 Consolidation and Modernization to Current Structure

Beginning in their earliest days as regional carriers serving a vast network of branch lines CN and CP have since the 1960’s evolved into long haul transcontinental railways. Today their strategic focus is to operate long trains across their mainline network while carefully managing their services on lighter density lines to focus on those that can profitably support their businesses. This shift in network structure and operating strategy resulted from forces that include: technological advancement, the emergence of competitive transportation modes, the need for financial viability and changes in government regulation. While improvements in railway technology, specifically the development of diesel locomotives\(^6\) to replace steam engines, provided the capability for railways to move longer heavier trains greater distances this development was more of an enabler than a driving force. The development of the U.S. and Canadian national highway systems in the 1950s and 1960s laid the groundwork for the development of viable competitors to the railways in shorter haul routes. Over many years the continued growth of the trucking industry eroded the railways’ market share in short haul and regional markets for many commodities. Significantly lower volumes in these markets contributed to railway financial losses as the regulatory regime of that period obligated them to continue serving shippers that still wanted to use railway services.

#### 1.21 Network Rationalization

Canada’s Class I railways have actively rationalized their networks since the National Transportation Act of 1967 provided the initial change in regulations that allowed federally regulated railways to discontinue or convey railway lines. While welcomed by the railways as an opportunity to rationalize their networks and improve the profitability of their operations the process proved to be arduous and time consuming for the railways. The Canada Transportation Act 1996 streamlined discontinuance and conveyance processes by removing much of the regulatory provisions for governmental approval contained in the predecessor regulations. Since 1996 CN and CP have filed discontinuance notices on some 2,900 miles of railway track in Canada. CN has been the more active of the two railways accounting for about 60% of total discontinuances during this time. As Figure 2 below shows the

\(^5\) The GTW and DW&P continue to exist as legal entities but are no longer operated at arm’s length from their Canadian parent.

\(^6\) The first diesel locomotive was invented in the 1890s and began to replace steam locomotive technology in the North American railway industry in the 1920s.
Prairie Provinces have experienced the majority of line discontinuances during this period accounting for approximately 65% of the total.

Figure 2  
CN and CP Canadian Railway Line Discontinuances 1996 - 2008\(^7\)

Much of this discontinuance activity was linked to the rationalization of the country elevator grain networks in the west which was occurring at the same time. The decision of the major Canadian grain companies to rationalize their elevator networks and adopt a strategy of constructing fewer high capacity elevators provided both the rationale and the ability for the railways to discontinue operations on many western Canadian branch lines.

\(^7\) Source: Canadian Transportation Agency
Of equal importance to the railways’ network rationalization strategies was their ability to sell railway lines to governments or private sector operators. The Canada Transportation Act 1996, using the experience of the U.S. short line industry as a guide, created a more commercial focus around such activities to encourage the development of the Canadian short line railway industry. Prior to 1996 there were only 12 short line railways in Canada as compared to approximately 49 in existence in 2009. Since 1996 CN and CP have conveyed more than 6,700 miles of track to short line operators in Canada. The development of the Canadian short line railway industry through the sale of railway lines by CN and CP allowed them to establish “feeder” networks that supported their long haul transcontinental systems. Short line operators brought distinct advantages to serving low density railway lines including lower cost operations and operational flexibility to meet the needs of shippers located in such regions while retaining access to the broader North American railway system. The conveyance of these lines to short line operators allowed CN and CP to retain a significant portion of the freight revenues associated with traffic originating or terminating on short lines while reducing their cost of service to the short line’s customers. The commercial terms of these short line agreements in most instances resulted in CN and CP retaining the commercial relationship with shippers including the setting of freight rates while short line operators effectively operated as agents of CN and CP.

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8 Source: “Grain Elevators in Canada”, Canadian Grain Commission www.grainscanada.gc.ca
9 This total includes approximately 1,900 miles of track for seven short lines in Quebec and Alberta which CN re-acquired between 2006 and 2008.
1.22 Short Line Railways

While many of the existing short line railyards in Canada were born of CN and CP’s network rationalization strategies dating back to the mid 1990s; they are as diverse in their ownership as they are in size, the geographic regions they serve and the nature of their relationship with the Class I carriers. With average hauls of only 130 miles the revenues earned by these carriers totaled only $522.2 million CDN in 2007. This represented slightly less than 6% of $9.435 billion CDN generated by the industry at large. The situation was not much different when their overall workload was considered; these carriers accounted for slightly less than 5% of total freight gross ton miles generated in Canada. However, in 2007 short line and regional carriers in Canada transported approximately 25% of total Canadian rail freight tonnage amounting to more than 90 million metric tons of rail freight.\(^\text{10}\) Much of this traffic represents origin and destination movements for transcontinental movements handled by CN and CP.

Owners of Canada’s short line and regional railways can be categorized into five basic groups: integrated transportation companies, non transportation private sector companies, municipal and provincial governments, local cooperatives and First Nations groups.

**Short Line Railway Ownership**

**Transportation Companies**

Twenty-one of Canada’s short line railyards are owned and operated by eleven integrated transportation companies that specialize in railway operations or have such operations as part of a broader portfolio of transportation assets. They include:

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<td>Southern Railway of Vancouver Island</td>
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<td>Southern Ontario Railway</td>
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<td>Genesee and Wyoming Inc.</td>
<td>Huron Central Railway</td>
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<td>Okanagan Valley Railway</td>
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<td>Kettle Falls International Railway</td>
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<tr>
<td>Trillium Railway Company</td>
<td>Port Colbourne Harbor Railway</td>
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\(^\text{10}\) Rail in Canada 2007, Table 9 – Rail Transportation, Summary statistics on freight and passenger transportation

\(^\text{11}\) Prior to their repurchase by CN in January 2006 RailAmerica owned three Alberta short lines including the Mackenzie Northern, Lakeland and Waterways and Central Western railways.
Private Sector Companies

Private sector companies own sixteen short line railways in Canada. Many of these railway operations provide dedicated transportation services for the movement of resource commodities produced by the companies that own them as opposed to general rail freight services to all shippers. Some examples of these include:

- Wabush Mining Company which operates two short lines in northern Labrador dedicated to the movement of iron ore from its mining operations near Labrador City to ship loading facilities at Point Noire, QC
- J.D. Irving Limited which owns and operates the New Brunswick Southern Railway operating on former Canadian Pacific trackage in New Brunswick. This railway offers general rail transportation services while also servicing the rail transportation needs of Irving affiliated companies.
- Great Sandhills Terminal, whose primary business is grain handling, owns the Great Sandhills Terminal Railway that provides rail services to its own grain elevator in southern Saskatchewan as well as individual producer car loaders.

Governments

Ontario Northland Railway (ONR) is the largest regional railway in Canada and the only railway that is owned by a provincial government. The railway is an operating division of the Ontario crown corporation Ontario Northland Transportation Commission (ONTC) and operates as an independent carrier interchanging traffic with both CN and CP.

The Barrie-Collingwood Railway is a municipally owned short line located in southern Ontario. While the railway is owned by the municipalities of Barrie and Collingwood the operation of the railway is contracted to Cando Contracting.

Prior to its repurchase by CN in December 2007 Cando Contracting owned the Athabasca Northern Railway

Officially known as the Societe des chemins de fer du Quebec (SCFQ)

ONR interchange operations for Canadian Pacific traffic are done through the Ottawa Valley Railway
First Nations

The Keewatin Railway Company was formed in 2006 when it purchased a 185 mile section of track from the Hudson Bay Railway, a subsidiary of OmniTrax Inc. that had previously purchased the line from CN in 1997. In 2005 the Tshuuetin Rail Transportation Company took over passenger and freight rail operations between Sept-Isles QC and Schefferville QC formerly operated by the Quebec North Shore and Labrador Railway, a division of the Iron Ore Company of Canada.

Cooperatives

With the recent establishment of the Boundary Trails Railway Company in southern Manitoba there are now eight short line railways in Canada owned by rural cooperatives. These railways are all located on former grain branch lines owned by CP and CN in Saskatchewan and Manitoba. These carriers operate principally to provide rail car loading and transportation services to grain producer car loaders located in these regions.

Appendix 2 provides a complete listing of short line railways in Canada.

Relationships with Class I Railways

The relationship between short line and regional railway operators and their Class I partners, whether CN or CP, can be categorized either as one of commercial and operational independence or as that of dedicated service agent. Which type of relationship a short line operator has with its Class I partner(s) is as much a function of the partner, the railway’s geographic location, the regional competitive environment for rail transportation and the importance of the traffic available to the Class I whether originating or terminating on the short line carrier’s network. The nature of this relationship often has a direct impact on the type of relationship the short line has with the customers it serves.

It is important to note that there is a segment of the short line railway industry - specifically those railways owned by non transportation companies whose principal purpose is the movement of their own commodities – where the Class I relationship is more akin to that of a shipper as opposed to a traditional railway to railway relationship. These operators are typically mining companies such as Wabush Mining, Iron Ore Company of Canada, or ArcelorMittal, located in remote regions of Canada who exist solely to meet their own transportation needs. For this reason these carriers are excluded from the following discussion of short line – Class I relationships in Canada.

Independent Operators

The term “independent” in this context indicates a short line railway has some degree of commercial and operational independence from its Class I partner(s) with respect to rate making, service delivery and has competitive alternatives for the interchange of traffic with other carriers.

However, a short line railway’s practical independence from its Class I partner(s) will be influenced by a number of factors including the competitive rail options available at the connection with the Class I carrier or carriers. In
some instances a shipper’s wishes with respect to the long haul routing of traffic may take precedence over the short line’s preferred connecting carrier in situations where multiple connections are available. In this regard the short line operator may have independence but insufficient leverage to maximize its own operational efficiencies or profitability.

These railways generally existed prior to the modern short line era spawned by the network rationalization activities of the 1990s and beyond. This is a small group consisting of only four carriers including Ontario Northland Railway (ONT), Southern Railway of British Columbia (SRY), the Essex Terminal Railway (ETR) and the Montreal, Maine & Atlantic Railway (MMA). While the ONR and MMA railways are traditional line haul carriers the SRY and ETR are terminal switching carriers with a small geographic footprint. However they share two critical characteristics that effectively convey upon them their independence.

- **Multiple Interchange Partners**

  All four carriers can physically interchange traffic with multiple Class I railways including CN and CP. The ONR interchanges traffic with CN at Hearst, North Bay and Noranda, QC and with CP at North Bay. The SRY has five physical interchanges with four different Class I railways – CN, CP, BNSF and UPRR\(^\text{15}\). The ETR interchanges with CN, CP and CSX at Windsor, ON.

  The Montreal, Maine and Atlantic Railway is slightly different in that the majority of its operations are located in the northeastern United States. In Canada it interchanges with CN at Ste. Rosalie, QC and St. Leonard, NB\(^\text{16}\) and with CP at St. Jean, QC. In addition it can interchange traffic with other short lines including the Quebec Gatineau Railway, the St. Lawrence and Atlantic Railway and the New Brunswick Southern Railway.

- **Pricing Freedom for Interline Traffic**

  These carriers all have the ability to establish their own revenue requirements for interline movements on traffic they originate and terminate on their lines. As we will see in the discussion that follows this is the exception rather than the norm.

**Service Agents**

The more traditional and prevalent relationship that exists between short lines and Class I railways in Canada is one where the short line acts as a service agent for its Class I partner. In this capacity the short line provides local switching services to customers and line haul services across its network for the purpose of interchanging traffic with its partner railway.

\(^{15}\) SRY interchange with Union Pacific at New Westminster is achieved through a haulage agreement with the BNSF.

\(^{16}\) MMA can also access CN by routing traffic via the New Brunswick Southern Railway with whom it connects at Brownville Junction, Maine.
A strategic focus of CN and CP in the 1990s when they began selling light density lines to short line operators was the retention of long haul movements for traffic originating and terminating on these lines. They achieved this in two ways. First, the carriers selected lines to sell that were located in remote or rural areas with a single point of connection to the Class I. Secondly they structured sale agreements that narrowly defined the commercial and operating rights of the short lines. Typically these agreements included provisions that:

- Gave exclusive interchange rights to CN or CP for all traffic originating or terminating on the short line
- Restricted the right of short line operators to establish rates for their customers other than for intra-line movements within their own network
- Established per car fee schedules, typically distance based, that determined how much revenue the short line operator could earn for the movement of every car moving in interchange service.

1.23 CN and CP Expansion 1995 to 2009

Following CN’s privatization, the company embarked on a series of major acquisitions intended to strengthen its position in the North American marketplace. The first of these came in 1998 when CN purchased the Illinois Central Railroad for US $2.4 billion, adding a north-south trunk to what had previously been an east-west oriented system. The IC’s primary lines extended from Chicago to New Orleans with branches that reached to Omaha, St. Louis, Baton Rouge, and Mobile. The merger with CN was made official on 1 July 1999, with the CN name and identity being retained.

In October 2001 CN purchased the Wisconsin Central Transportation Corp. for US $1.2 billion, which served to fill an important gap in the company’s new Y-shaped transcontinental system. The company’s 2,900-mile network had a main line that extended from Chicago to Superior, Wisconsin, as well as primary branches that ran west to Minneapolis, and east across Wisconsin and Michigan's Upper Peninsula to Sault Ste. Marie and Hearst, Ontario.\(^\text{17}\)

CN expanded its network twice again in 2004. In May of that year CN completed a US $395 million purchase of Great Lakes Transportation, whose primary rail components included the Bessemer and Lake Erie Railroad (BLE) and the Duluth, Missabe and Iron Range Railroad (DM&IR). The BLE is a major hauler of Appalachian coal destined for the Great Lakes, as well as iron ore and limestone bound for the Pittsburgh area. The DM&IR is the largest transporter of iron ore in the U.S. moving taconite from plants in the Mesabi iron range of northeastern Minnesota to the ports of Duluth and Two Harbors on the shores of Lake Superior. The company then purchased the large regional carrier in British Columbia, BC Rail Ltd., in July 2004.

CN’s most recent purchase came in January 2009 when it acquired a large part of the Elgin, Joliet and Eastern Railway (EJ&E) from US Steel. This acquisition is seen to be a strategic acquisition to provide CN with a means of bypassing the congested centre of Chicago.

---

\(^{17}\) The Wisconsin Central’s Canadian operations extending from Sault Ste Marie to Hearst consisted of the Algoma Central Railway (ACR) that had been purchased by WC in 1995.
CN’s acquisitions in the last decade were not, however, restricted to these larger properties. The company also re-purchased a number of short line railways between 2006 and 2008, many of them operations that CN had itself sold off less than decade before.

Figure 4 Short Line Railways Re-purchased by CN 2006 to 2008

<table>
<thead>
<tr>
<th>2006</th>
<th>Mackenzie Northern Railway</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Lakeland &amp; Waterways Railway</td>
</tr>
<tr>
<td>2006</td>
<td>Central Western Railway</td>
</tr>
<tr>
<td>2006</td>
<td>Savage Alberta Railway</td>
</tr>
<tr>
<td>2007</td>
<td>Athabasca Northern Railway</td>
</tr>
<tr>
<td>2008</td>
<td>Chemin de fer de la Matapédia et du Golfe</td>
</tr>
<tr>
<td>2008</td>
<td>New Brunswick East Coast Railway</td>
</tr>
<tr>
<td>2008</td>
<td>Ottawa Central Railway</td>
</tr>
</tbody>
</table>

Canadian Pacific’s rail network by comparison has remained relatively stable in the last fifteen years. It has made only one major acquisition during this period, its US $1.5 billion purchase of the Dakota, Minnesota and Eastern Railroad in 2007. The transaction included the Iowa, Chicago and Eastern Railroad and other affiliated companies. The merger was an “end-to-end” consolidation that extended the CPR’s reach westward from Winona, Minnesota, as well as Chicago. The acquisition was intended to give the CPR access to shipments of agricultural products and ethanol in addition to coal from the Wyoming coal fields. The company assumed control of the DM&E and IC&E in October 2008.

1.3 Railway Industry Today

The North American railway network encompasses just over 320,000 miles of track in Canada, the United States and Mexico.19

Figure 5 North American Railway Mileages 1990 – 2006

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2006</th>
<th>Net Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>52,537</td>
<td>46,373</td>
<td>-6,164</td>
</tr>
<tr>
<td>United States</td>
<td>319,978</td>
<td>257,115</td>
<td>-62,863</td>
</tr>
<tr>
<td>Mexico</td>
<td>16,381</td>
<td>16,568</td>
<td>187</td>
</tr>
<tr>
<td>Total</td>
<td>388,896</td>
<td>320,056</td>
<td>-68,840</td>
</tr>
</tbody>
</table>

18 These three railways were all subsidiaries of the Quebec Railway Corporation. In addition to purchasing the railways CN acquired the QRC’s rail ferry operation and assumed operational management of QRC’s Chemin de fer de la Gaspesie on a contractual basis.
19 Source: North American Transportation Statistics Database. Railway mileages include all main routes, yard and other tracks. 2006 is the last full year for which data is available.
Although the composition of the railway systems in all three countries had changed since 1990, losing some 68,800 miles in total, the vast majority of the overall reduction in infrastructure mileage was attributable to rail line abandonments that occurred in the Canadian and U.S. railway systems. This 18% contraction in the American and Canadian systems resulted primarily from significant restructuring that followed industry deregulation in the 1980s. In Canada much of this came about as a result of the federal government’s easing of the regulatory hurdles associated with the abandonment of uneconomic branch lines while in the U.S. system restructuring was facilitated by the passing of the Staggers Rail Act in 1980. Only the Mexican railway system, which remains more heavily regulated than those of the United States and Canada, remained effectively unchanged throughout this period.

1.31 Classification of Rail Carriers

In Canada and the United States the definitions for the classification of railways are set out in each country’s respective regulations. In Canada these are defined in the regulations made pursuant to the Canada Transportation Act\(^\text{20}\) while in the United States they are defined in the Accounting regulations of the Surface Transportation Board. Both countries classify carriers into three categories or classes – Class I, II, or III – based on their gross revenues although the revenue thresholds employed differ in each country. Canadian regulations define carrier classifications as follows:

<table>
<thead>
<tr>
<th>Railway Classification</th>
<th>Revenue Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>CDN $250 million or greater</td>
</tr>
<tr>
<td>Class II</td>
<td>Less than CDN $250 million</td>
</tr>
<tr>
<td>Class III</td>
<td>Any railway company other than a Class I or II carrier engaged in the operation of bridges, tunnels and stations</td>
</tr>
</tbody>
</table>

In the United States, carriers are classified by the Surface Transportation Board (STB) according to their annual adjusted operating revenues. Revenues are adjusted to eliminate the effects of inflation using the annual average Railroad Freight Price Index developed by the U.S. Bureau of Labor Statistics\(^\text{21}\). Figure 7 below illustrates the current revenue thresholds employed and how they have changed since 1991.

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\(^{20}\) Carriers and Transportation and Grain Handling Undertakings Information Regulations (SOR/96-334)

\(^{21}\) The formula used to calculate a carrier’s current year revenues for classification purposes is - Current-Year Revenues (1991 Index / Current Year Index). For the year 2007 the index had a value of 0.6952
Table: United States Railway Classification Criteria

<table>
<thead>
<tr>
<th>Railway Classification</th>
<th>1991 Revenue Thresholds</th>
<th>2007 Revenue Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>$250 million USD or greater</td>
<td>$359.6 million USD or greater</td>
</tr>
<tr>
<td>Class II</td>
<td>$20 – 250 million USD</td>
<td>$28.8 – 359.6 million USD</td>
</tr>
<tr>
<td>Class III</td>
<td>Less than $20 million USD</td>
<td>Less than $28.8 million USD</td>
</tr>
</tbody>
</table>

Whereas the definition of Class I carriers is widely accepted in the American and Canadian railway industries non Class I carriers are often referred to within the industry as regional or short line railways. These terms are not set out in regulation but rather are industry conventions. In the United States the Association of American Railroads as well as the American Short Line and Regional Railroad Association define regional and short line railways as follows:

- **Regional railroads**
  - line-haul carriers operating at least 350 miles of road and/or having revenues between US $40 million annually and the Class I threshold; and

- **Short line railroads**
  - Local railroads - line-haul carriers operating less than 350 miles of road and having annual revenues of less than US $40 million; or
  - Switching and Terminal railroads - those that primarily provide switching and/or terminal services performing pickup and delivery services at customer facilities or transferring cars between railways

Generally, Class II carriers are referred to as regional railroads and Class III carriers are referred to as short lines.

**North American Class I Carriers**

There are currently eight Class I freight and passenger railways operating in the United States today as compared to forty when the Staggers Rail Act was passed in 1980. Although much of the reduction can be attributed to an elevation in the revenue threshold, it is also a direct result of the industry consolidation that has taken place over the past quarter century. Among the more prominent of these were the merger of the Atchison, Topeka and Sante Fe Railway with the Burlington Northern Railroad in 1996; the acquisition of the Southern Pacific Railway by the Union Pacific Railroad that same year; the purchase and subsequent breakup of Consolidated Rail Corporation

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22 Surface Transportation Board accounting regulations - 49 CFR Part 1201 Subpart A. The classification of US railways as Class I, II or III was started by the Interstate Commerce Commission in the 1930s. Initially the revenue threshold of a Class I carrier was US $1 million. At that time, there were well over 100 carriers that met this test. These definitions have been modified several times over the intervening years with the current criteria established in 1992.
(Conrail) by CSX Transportation and Norfolk Southern in 1999; and the merger of the Illinois Central Railroad with the Canadian National Railway Company, also in 1999.

If the American standards are extended to include railways located elsewhere on the continent, the list would increase to include the operations of five other carriers including Canada’s two principal freight carriers, Canadian National Railways and Canadian Pacific Railway, as well as the passenger operations of VIA Rail Canada. For operations based in Mexico, the list would expand to include those of the Ferrocarril Mexicano and the Kansas City Southern de México (a wholly owned subsidiary of the Kansas City Southern Railway).

As a result, the industry commonly alludes to the integrated operations of eight freight railway companies when referring to the largest carriers on the continent. Ranked in descending order by their revenues in 2008, these are:

- Burlington Northern Sante Fe Railway (BNSF)
- Union Pacific Railroad (UPRR)
- CSX Transportation Inc. (CSX)
- Norfolk Southern Railway (NS)
- Canadian National Railway (CN)\(^{23}\)
- Canadian Pacific Railway (CPR)\(^{24}\)
- Kansas City Southern Railway (KCSR)
- Ferrocarril Mexicano (Ferromex)

Given the degree of integration, the American industry has commonly recognized the larger Canadian-based parents of Grand Trunk Corporation and the Soo Line Railroad Company in the wider list of Class I carriers. Similarly, the subsidiary Mexican operations of U.S. based Kansas City Southern Railway is also frequently taken into account along with its parent. Figure 8 below shows the geographic reach of the major U.S. and Canadian rail networks for these carriers.

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\(^{23}\) Including its US subsidiary Grand Trunk Corporation
\(^{24}\) Including its US subsidiary SOO Line Railroad
1.32 CN and CP Networks

The Canadian railway network (2007 estimate) includes 29,600 route-miles\(^{25}\) within a total of approximately 44,900 miles of track.\(^{26}\) Just over three-quarters of this total, some 22,960 route miles, were operated by

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\(^{25}\) Includes first main track owned and operated under lease, contract, trackage rights or joint ownership as published in Rail in Canada 2007 – Catalogue 52-216-X

\(^{26}\) This is a broad measure of overall railway infrastructure that incorporates all mainline track, as well as yard, sidings and industrial track. Statistics Canada, Catalogue no. 52-216-X.
Canadian National and Canadian Pacific. Much of the remainder was operated by the various regional and short line railways distributed across the country.27

**Canadian National**

CN is the larger of Canada’s two Class I railways operating a network of approximately 21,000 route-miles that spans from coast to coast in Canada and extends southward through the mid-western United States to the port city of New Orleans. The railway provides direct rail service to the ports of Vancouver and Prince Rupert on Canada’s west coast, the eastern Canadian ports of Thunder Bay, Montreal, Quebec City, Saint John and Halifax, as well as the American ports of New Orleans and Mobile on the Gulf of Mexico.

The company’s North American rail network includes twenty-two (22) major railway classification yards in Canada and the United States. Its transcontinental intermodal network consists of sixteen (16) terminals located throughout Canada and the United States.

While the company originates approximately 87% of the traffic moving along its network it, like all major railways in North America relies heavily on the ability to interchange traffic with other railways in both Canada and the United States.

In Canada CN interchanges traffic with other railways using 115 interchange locations located in nearly 100 municipalities across the country. It is capable of interchanging traffic with four Class I freight railways including CP, BNSF, CSXT, and UP at various locations in Canada. As would be expected it has more physical interchanges in Canada with Canadian Pacific than with any other carrier. Key interchange points with these carriers are located in the greater metropolitan areas of Vancouver, Toronto, and Montreal.

In addition to its connections with the Class I carriers CN also formally interchanges traffic with some thirteen short line railways across Canada. In addition to these interchange arrangements the company also exchanges traffic with a number of feeder short line railways such as the Hudson Bay Railway at The Pas, MB under commercial and operating agreements that do not involve formal interchange reporting.28 In the United States the city of Chicago is CN’s principal interchange location where it has access to 19 different railways at seven different physical interchange locations within the greater Chicago area. Other key U.S. interchange points include Buffalo, New York and East St. Louis, Illinois. As it does in Canada CN also interchanges traffic with many short line, regional, and terminal railways across the United States.

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27 A total of 6,596 route-miles were registered against regional and short line railways, while another 134 route-miles were tied to the operations of VIA Rail Canada.

28 When traffic is exchanged between railways without formal interchange reporting, the receiving road acts as the operational agent of the delivering road. In these cases, commercial responsibility for the customer relationship and any commercial issues associated with the traffic remain the responsibility of the delivering road even when the traffic is on the receiving road.
**Figure 9 CN Canadian Interchange Locations**

<table>
<thead>
<tr>
<th>Class I Railways:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interchanging Railway</td>
<td>Province</td>
<td>No. of I/C Facilities</td>
<td>Key Locations</td>
</tr>
<tr>
<td>BNSF Railway</td>
<td>BC</td>
<td>4</td>
<td>Vancouver</td>
</tr>
<tr>
<td></td>
<td>MB</td>
<td>2</td>
<td>Winnipeg, Emerson</td>
</tr>
<tr>
<td>Canadian Pacific Railway</td>
<td>AB</td>
<td>5</td>
<td>Edmonton, Calgary</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>10</td>
<td>Vancouver, Kamloops</td>
</tr>
<tr>
<td></td>
<td>MB</td>
<td>5</td>
<td>Winnipeg, Brandon</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>45</td>
<td>Toronto</td>
</tr>
<tr>
<td></td>
<td>PQ</td>
<td>11</td>
<td>Montreal</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>14</td>
<td>Saskatoon, Regina</td>
</tr>
<tr>
<td>CSX Transportation</td>
<td>ON</td>
<td>3</td>
<td>Sarnia, Windsor</td>
</tr>
<tr>
<td></td>
<td>PQ</td>
<td>3</td>
<td>Montreal</td>
</tr>
<tr>
<td>Union Pacific Railroad</td>
<td>BC</td>
<td>3</td>
<td>Vancouver</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Short Line and Regional Railways:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Interchanging Railway</td>
<td>Province</td>
<td>No. of I/C Facilities</td>
<td>Key Locations</td>
</tr>
<tr>
<td>Cape Breton &amp; Central Nova Scotia Railway</td>
<td>NS</td>
<td>1</td>
<td>Truro</td>
</tr>
<tr>
<td>Carlton Trail Railway</td>
<td>SK</td>
<td>4</td>
<td>Saskatoon</td>
</tr>
<tr>
<td>Chemin de fer Baie Des Chaleurs</td>
<td>NB</td>
<td>1</td>
<td>Moncton</td>
</tr>
<tr>
<td>ECORAIL</td>
<td>PQ</td>
<td>1</td>
<td>Chambly</td>
</tr>
<tr>
<td>Essex Terminal Railway</td>
<td>ON</td>
<td>1</td>
<td>Windsor</td>
</tr>
<tr>
<td>Montreal Maine and Atlantic Railway</td>
<td>NB</td>
<td>1</td>
<td>St. Leonard</td>
</tr>
<tr>
<td></td>
<td>PQ</td>
<td>4</td>
<td>Sherbrooke</td>
</tr>
<tr>
<td>New Brunswick Southern Railway</td>
<td>NB</td>
<td>1</td>
<td>Saint John</td>
</tr>
<tr>
<td>Ontario Northland Railway</td>
<td>ON</td>
<td>2</td>
<td>Hearst, North Bay</td>
</tr>
<tr>
<td></td>
<td>PQ</td>
<td>1</td>
<td>Noranda</td>
</tr>
<tr>
<td>Roberval and Saguenay Railway</td>
<td>PQ</td>
<td>2</td>
<td>Arvida</td>
</tr>
<tr>
<td>Southern Railway of British Columbia</td>
<td>BC</td>
<td>2</td>
<td>Vancouver</td>
</tr>
<tr>
<td>ST Rail System</td>
<td>NB</td>
<td>1</td>
<td>Saint John</td>
</tr>
<tr>
<td>Thunder Rail</td>
<td>SK</td>
<td>1</td>
<td>Crane</td>
</tr>
<tr>
<td>Windsor &amp; Hantsport Railway</td>
<td>NS</td>
<td>1</td>
<td>Windsor Jct.</td>
</tr>
</tbody>
</table>

---

29 Source: Association of American Railroads Open and Prepay Station List (OPSL)
30 Counts for Vancouver, Montreal, and Toronto include physical interchange facilities located within the greater metropolitan areas of these cities.
Figure 10 CN Network System Map

Source: CN Investor Fact Book - 2009
Canadian Pacific

The Canadian Pacific Railway is the smaller of Canada’s two Class I railways. With a network spanning 15,500 route miles of track in both Canada and the United States it is about 75% the size of CN. CP’s network extends from Vancouver to Montreal and reaches as far south as Kansas City, Chicago, Philadelphia and New York.

CP, in direct competition with CN, serves some of Canada’s key port cities including Vancouver, Montreal, Thunder Bay and Quebec. In the United States CP, through its U.S. subsidiary the Delaware & Hudson Railway, has direct access to the ports of New York and Philadelphia through haulage and trackage rights agreements that allow it to operate over the lines of other railways.

The company’s rail network is comprised of fourteen (14) major railway classification yards in Canada and the United States. Its intermodal network consists of fourteen (14) terminals with total annual lift capacity of approximately 2.4 million TEUs with nearly one-third of this capacity situated in its two intermodal terminals located in the Toronto area.

Like CN, CP depends on its ability to interchange traffic with other railways in Canada and the United States. In Canada the railway has more than 100 interchange locations located in nearly 90 different municipalities throughout the country. It is capable of interchanging traffic with CN, BNSF, CSXT, and UP at various locations in Canada. Key interchange locations with these carriers are located in the greater metropolitan areas of Vancouver, Toronto, and Montreal.

In addition to its connections with the Class I carriers CP also interchanges traffic with nine short line and regional railways in Canada. In addition to these formal interchange arrangements the company also exchanges traffic with a number of feeder short line railways such as the Great Western Railway at Assiniboia, SK under commercial and operating agreements that do not involve formal interchange reporting.

In the United States the city of Chicago is CP’s principal interchange location where it has access to 19 different railways at seven different physical interchange locations within the greater Chicago area. Other key U.S. interchange points include Buffalo, New York and East St. Louis, Illinois. The railway also interchanges traffic with many short line, regional, and terminal railways across the United States.

32 CP’s access to the Port of Quebec is via the Quebec Gatineau Railway
### Class I Railways:

<table>
<thead>
<tr>
<th>Interchanging Railway</th>
<th>Province</th>
<th>No. of I/C Facilities</th>
<th>Key Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNSF Railway</td>
<td>AB</td>
<td>1</td>
<td>Coutts</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>3</td>
<td>Vancouver, Kingsgate</td>
</tr>
<tr>
<td></td>
<td>MB</td>
<td>2</td>
<td>Winnipeg</td>
</tr>
<tr>
<td>Canadian National Railways</td>
<td>AB</td>
<td>5</td>
<td>Calgary, Edmonton</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>10</td>
<td>Vancouver, Kamloops</td>
</tr>
<tr>
<td></td>
<td>MB</td>
<td>5</td>
<td>Winnipeg, Brandon</td>
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<td>Montreal</td>
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<td>SK</td>
<td>14</td>
<td>Regina, Saskatoon</td>
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<td>CSX Transportation</td>
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<td>London</td>
</tr>
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<td></td>
<td>PQ</td>
<td>1</td>
<td>Adirondack</td>
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<tr>
<td>Union Pacific Railroad</td>
<td>AB</td>
<td>1</td>
<td>Coutts</td>
</tr>
<tr>
<td></td>
<td>BC</td>
<td>4</td>
<td>Vancouver, Kingsgate</td>
</tr>
</tbody>
</table>

### Short Line and Regional Railways:

<table>
<thead>
<tr>
<th>Interchanging Railway</th>
<th>Province</th>
<th>No. of I/C Facilities</th>
<th>Key Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Manitoba Railway</td>
<td>MB</td>
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<td>Winnipeg</td>
</tr>
<tr>
<td>Chemin de fer Lanaudiere</td>
<td>PQ</td>
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<td>Joliette</td>
</tr>
<tr>
<td>Essex Terminal Railway</td>
<td>ON</td>
<td>1</td>
<td>Windsor</td>
</tr>
<tr>
<td>Huron Central Railway</td>
<td>ON</td>
<td>2</td>
<td>Sault St Marie, Sudbury</td>
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<tr>
<td>Montreal Maine and Atlantic Railway</td>
<td>PQ</td>
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<td>St. Jean</td>
</tr>
<tr>
<td>Ontario Northland Railway</td>
<td>ON</td>
<td>1</td>
<td>North Bay</td>
</tr>
<tr>
<td>Ottawa Central Railway</td>
<td>ON</td>
<td>2</td>
<td>Pembroke</td>
</tr>
<tr>
<td>Southern Rails Cooperative</td>
<td>SK</td>
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<td>Rockglen</td>
</tr>
<tr>
<td>Southern Railway of British Columbia</td>
<td>BC</td>
<td>5</td>
<td>Vancouver</td>
</tr>
</tbody>
</table>

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33 Source: Association of American Railroads Open and Prepay Station List (OPSL)
Figure 12  CP Rail System Map

Source: 2009 Canadian Pacific Corporate Profile and Fact Book
### 1.33 Principal Rail Corridors

Traffic density for a railway network is often expressed in terms of gross ton miles\(^{35}\) per route mile. As can be seen in Figures 14 and 15 below traffic density across a railway network can vary significantly with the most dense network segments carrying up to eight times as much traffic as the least dense network segments. Although CN and CP use slightly different thresholds to categorize network density they are roughly comparable.

#### Figure 13  CN and CP Traffic Density Scales

<table>
<thead>
<tr>
<th>Category</th>
<th>CN</th>
<th>CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>More than 50 million GTMs per route mile</td>
<td>45 million or more GTMs per route mile</td>
</tr>
<tr>
<td>Category 2</td>
<td>30 - 50 million GTMs per route mile</td>
<td>30 - 45 million GTMs per route mile</td>
</tr>
<tr>
<td>Category 3</td>
<td>10 - 30 million GTMs per route mile</td>
<td>15 - 30 million GTMs per route mile</td>
</tr>
<tr>
<td>Category 4</td>
<td>Less than 10 million GTMs per route mile</td>
<td>Less than 15 million GTMs per route mile</td>
</tr>
</tbody>
</table>

Looking at CN and CP’s railway networks we can see some similarities between the two with respect to traffic density across their systems.

For both railways the network segments that have the highest traffic density are located in western Canada between Winnipeg, MB and Vancouver, BC. This is a reflection of the importance of the Port of Vancouver for both originating and terminating traffic for both railways. For both railways Vancouver is the most significant port for the export of bulk commodities including coal, sulphur, and grain – most of which originates in Alberta and Saskatchewan. Vancouver is also the largest port in Canada for the movement of containerized import and export traffic handling approximately 2.5 million TEUs annually\(^{36}\) of which some 70% moves to and from the port by rail much of it originating and terminating in central Canada. The Montreal – Chicago corridor is of comparable density for CN reflecting the significant movement of intermodal traffic between the U.S. Midwest and the Canadian ports of Montreal and Halifax.

Category 2 segments for both carriers include the rail lines that run between western Canada - in CP’s case Regina and in CN’s Winnipeg - and Chicago as well as the transcontinental routes that bridge western and eastern Canada. For CN its main line that runs south of Chicago to Jackson, MS also falls into this category.

---

\(^{35}\) The number of tons behind the locomotives (cars and contents) including company service equipment multiplied by the miles of road moved from originating to destination stations on a designated railroad.

\(^{36}\) Source: Port Metro Vancouver Statistics Overview 2008
Figure 14  CN Network Density Map

Source: CN Investor Fact Book - 2009
Source: 2009 Canadian Pacific Corporate Profile and Fact Book
1.34 Co-Production and Other Operating Agreements

CN and CP, like all North American Class I railways, own the core rail infrastructure on which they operate. However, their operations and market reach are not limited to these core networks. Most Class I railways in North America use operating agreements with other railways to move their customers’ traffic. These types of arrangements can be bi-lateral (between two railways) or multi-lateral (between three railways or more) in nature. Generically referred to as co-production agreements they are strategic initiatives designed to deliver value to the parties in the form of lower costs and or increased revenues through the sharing of rail trackage, yards, and services between railways. Depending on the specific operating and commercial terms of such agreements they are typically referred to as haulage\textsuperscript{39}, trackage rights\textsuperscript{40} or directional running agreements. CN and CP have established such agreements with one another as well as with other Class I railways in different parts of their networks. As Figure 16 below illustrates CN and CP are not significant users of trackage rights agreements when compared to their U.S. counterparts.

Figure 16 North American Class I Railway Route Miles and Trackage Rights (2008)\textsuperscript{41}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure16.png}
\caption{North American Class I Railway Route Miles and Trackage Rights (2008)\textsuperscript{41}}
\end{figure}

\begin{itemize}
\item \textsuperscript{39} An agreement between two railways whereby one carrier transports the freight traffic of another over its lines for a negotiated fee
\item \textsuperscript{40} Agreement between two railways whereby one carrier grants the other the right to operate its trains over its railway tracks.
\item \textsuperscript{41} Source: 2008 Class I Railroad Annual Reports as Submitted to the Surface Transportation Board
\end{itemize}
Some of the more significant agreements in this regard are summarized in Appendix 1. As the commercial terms are confidential between the parties our description is limited to the operational aspects of these arrangements.

In Canada two of the most significant co-production agreements put in place in recent years involve CN and CP train operations through the Fraser Canyon in southwestern British Columbia and in the Vancouver Lower Mainland.

In 2000 CN and CP initiated directional running through the Fraser Canyon west of Ashcroft, BC to Mission. Under this agreement all westbound trains of both railways operate on CN’s rail line and all eastbound trains of both railways operate on CP’s line for a distance of approximately 240 kilometers.

In January 2006 CN and CP announced a co-production agreement designed to improve the fluidity and efficiency of rail operations in the Vancouver Lower Mainland. The agreement included a number of operational initiatives to improve the movement of trains to and from the port through the operation of direct-to-destination trains bypassing yards and eliminating the interchange of traffic between the carriers. This agreement enhanced existing operating agreements negotiated in 2004 and also extended the existing Fraser Canyon directional running zone west to the ports and terminals. Key provisions include:

- CP operates all trains of both railways from Boston Bar to Vancouver's South Shore using CP train crews.
- CP assumes operational responsibility for switching all traffic into and out of terminals on Burrard Inlet South Shore.
- CN operates all trains for both railways from Boston Bar to Burrard Inlet North Shore in Vancouver using CN train crews.
- CN assumes operational responsibility for switching of all traffic into and out of terminals on the North Shore.
- CP operates all coal trains for both railways from Boston Bar to Westshore Terminals

Figure 17 below provides a graphical illustration of the operational aspects of this agreement.
Description of Canada’s Rail Based Freight Logistics System

Figure 17  CN – CP Vancouver Lower Mainland Co-production Operations
2. Commercial Profile of Canada’s Railways

The commercial and market profiles of Canadian National and Canadian Pacific are very similar in many respects given that they serve largely the same markets and that their networks run parallel to one another in many parts of the country. At CDN $8.5 billion CN’s annual revenues are 60% larger than CP’s. It is the larger of the two railways as measured by almost any metric including gross ton miles, annual revenues, carloads transported, and number of employees among others. As shown in Figure 18 below, in addition to being the larger of the two it has also experienced the fastest growth and has outpaced CP in the improvements it has made in its efficiency as measured by the improvements in its operating ratio since 2001.

Figure 18 Comparisons of CN and CP\(^{42}\)

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>5 Year Average</th>
<th>2001 – 2008 Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CN</td>
<td>CP</td>
<td>CN</td>
</tr>
<tr>
<td>Revenues (billion)</td>
<td>$8.482</td>
<td>$4.932</td>
<td>$7.577</td>
</tr>
<tr>
<td>Carloads (million)</td>
<td>4.615</td>
<td>2.645</td>
<td>4.736</td>
</tr>
<tr>
<td>Gross Ton Miles (billion)</td>
<td>339.8</td>
<td>239.6</td>
<td>343.3</td>
</tr>
<tr>
<td>Revenue Ton Miles (billion)</td>
<td>177.9</td>
<td>124.5</td>
<td>180.6</td>
</tr>
<tr>
<td>Employees</td>
<td>22,695</td>
<td>15,783</td>
<td>22,297</td>
</tr>
<tr>
<td>Capital Investment (billion)</td>
<td>$1.424</td>
<td>$0.959</td>
<td>$1.272</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>65.9</td>
<td>78.6</td>
<td>64.2</td>
</tr>
</tbody>
</table>

Beyond the difference in size a key differentiator of the two railways is the relative weighting of individual market segments within each carrier’s business profile. Generally speaking railways in North America categorize their primary lines of business into three principal categories that usually include the following commodity groups:

<table>
<thead>
<tr>
<th>Line of Business</th>
<th>Industry Sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk</td>
<td>Coal, sulphur, potash, grain</td>
</tr>
<tr>
<td>Merchandise</td>
<td>Forest products, petroleum, chemicals, minerals, automotive</td>
</tr>
<tr>
<td>Intermodal</td>
<td>Domestic retail and wholesale intermodal; containerized import / export traffic</td>
</tr>
</tbody>
</table>

---

\(^{42}\) Source: CN and CP Annual Reports 2001 - 2008
Although the North American railway industry uses standardized commodity codes\textsuperscript{43} and definitions at a detailed level each carrier aggregates and groups these individual commodities into broader commodity and market segment definitions that are reflective of their particular business. It is on the basis of these individualized commodity groupings or business unit definitions that North American railways report their revenues and other market related statistics such as carloads and revenue ton miles in their annual reports, financial reports and regulatory filings.

In the case of CN and CP each carrier reports its revenues segmented into seven business units. As illustrated in the tables below they are reasonably similar. Key differences include:

- CP treats grain as a separate business unit whereas CN groups it with its fertilizer business including potash;
- CP groups its sulphur and fertilizer businesses together including potash whereas CN includes sulphur with its petroleum and chemicals business; and
- CN distinctly reports metals and minerals revenues as a separate business unit whereas CP includes it in its industrial products business.

How railways define these business units changes over time to reflect changes in their markets and in some instances the structure of their marketing organizations. These differences aside we can make some general observations regarding how the two carriers’ business profiles compare to one another.

- CN’s business portfolio is much more balanced than CP’s with no single business unit representing more than 19\% of revenues
- CP’s business profile is much more heavily weighted to intermodal and bulk traffic as compared to CN with these two business lines representing more than 70\% and 80\% of revenues and carloads respectively as compared to approximately 45-50\% for CN
- CN’s business portfolio is more heavily weighted to merchandise traffic than is CP’s representing approximately 50\% of CN’s revenues and volumes
- Intermodal is the largest business segment for both carriers and with the exception of CN’s Metals and Minerals group has been the fastest growing business line for both carriers since 2001

The sections below provide a more detailed review of CN and CP’s business units or lines of business on both a revenue basis and volume basis (carloads).

\textsuperscript{43} Standard Transportation Commodity Classification (STCC) is an industry standard set of seven, six, and five digit commodity codes used by railways in North America.
2.1 Canadian National

With 2008 revenues of CDN $ 8.482 billion CN is Canada’s largest railway and the fifth largest railway in North America. The diversification of the company’s market extends to the characteristics of the traffic moving across its network with approximately one-third of its 2008 revenues derived from trans-border movements between Canada and the U.S., 26% from overseas shipments, 24% from domestic Canadian traffic, and 19% from movements wholly within the United States. The company originates approximately 87% of the freight traffic it carries.

Figure 19  CN Commercial Profile

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum &amp; Chemicals</td>
<td>$ 1,346</td>
<td>16 %</td>
<td>547</td>
<td>12 %</td>
<td>$ 423</td>
<td>46 %</td>
<td>28</td>
<td>5 %</td>
</tr>
<tr>
<td>Metals and Minerals</td>
<td>$ 950</td>
<td>11 %</td>
<td>1,025</td>
<td>22 %</td>
<td>$ 492</td>
<td>107 %</td>
<td>738</td>
<td>257 %</td>
</tr>
<tr>
<td>Forest Products</td>
<td>$ 1,436</td>
<td>17 %</td>
<td>511</td>
<td>11 %</td>
<td>$ 348</td>
<td>32 %</td>
<td>10</td>
<td>2 %</td>
</tr>
<tr>
<td>Coal</td>
<td>$ 478</td>
<td>6 %</td>
<td>375</td>
<td>8 %</td>
<td>$ 140</td>
<td>41%</td>
<td>(142)</td>
<td>-27 %</td>
</tr>
<tr>
<td>Grain and Fertilizers</td>
<td>$ 1,382</td>
<td>16 %</td>
<td>579</td>
<td>13 %</td>
<td>$ 221</td>
<td>19 %</td>
<td>(11)</td>
<td>-2 %</td>
</tr>
<tr>
<td>Intermodal</td>
<td>$ 1,580</td>
<td>19 %</td>
<td>1,377</td>
<td>30 %</td>
<td>$ 611</td>
<td>63%</td>
<td>274</td>
<td>25 %</td>
</tr>
<tr>
<td>Automotive</td>
<td>$ 469</td>
<td>6 %</td>
<td>201</td>
<td>4 %</td>
<td>$ (51)</td>
<td>-10 %</td>
<td>(103)</td>
<td>-34 %</td>
</tr>
<tr>
<td>Other Revenues</td>
<td>$ 841</td>
<td>10 %</td>
<td>-</td>
<td>-</td>
<td>$ 646</td>
<td>330 %</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$ 8,482</strong></td>
<td><strong>4,615</strong></td>
<td></td>
<td></td>
<td><strong>$ 2,830</strong></td>
<td></td>
<td><strong>794</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Highlights:**

- Intermodal  
  • CN’s largest business segment at 19% of revenues and 30% of volumes  
  • Consists of domestic and import-export container traffic that account for 48% and 52% respectively of business unit revenues

- Forest Products  
  • CN is one of the largest handlers of forest products in North America  
  • Key commodities include lumber, panels, paper, woodpulp, woodchips, logs and recycled paper.

- Grain & Fertilizers  
  • 80% of business accounted for by movement of grain and other agricultural products

- Petroleum & Chemicals  
  • Includes chemicals, sulphur, plastics, petroleum products and liquefied petroleum gas

- Metals & Minerals  
  • Leading business unit since 2001 in revenue and volume growth

---

44 All figures drawn from CN Annual Report - 2008
• Key growth driver is 2004 purchase of Duluth, Missabe and Iron Range Railway Company (DM&IR) that handles approximately 200,000 carloads per year of pelletized iron ore

**Automotive**

• Consists of finished vehicles and automotive parts traffic that account for 87% and 13% of revenues respectively

• 80% of traffic originated on CN

**Coal**

• U.S. originated coal represents approximately 50% of CN’s total coal volume

• U.S. traffic is mainly thermal coal for power generation whereas Canadian volumes are primarily metallurgical coal exports for overseas steel production.

### 2.2 Canadian Pacific

Bulk commodities, particularly coal, are key elements of the railway’s traffic base accounting for about 43% of its 2008 revenues. Another 29% was generated from intermodal shipments, and 28% from merchandise traffic.

**Figure 20**  
CP Commercial Profile

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>$970</td>
<td>20%</td>
<td>382</td>
<td>14%</td>
<td>$221</td>
<td>30%</td>
<td>39</td>
<td>11%</td>
</tr>
<tr>
<td>Coal</td>
<td>$607</td>
<td>12%</td>
<td>281</td>
<td>11%</td>
<td>$133</td>
<td>28%</td>
<td>(98)</td>
<td>-26%</td>
</tr>
<tr>
<td>Sulphur and Fertilizers</td>
<td>$509</td>
<td>10%</td>
<td>191</td>
<td>7%</td>
<td>$128</td>
<td>33%</td>
<td>21</td>
<td>13%</td>
</tr>
<tr>
<td>Forest Products</td>
<td>$238</td>
<td>5%</td>
<td>92</td>
<td>3%</td>
<td>$(117)</td>
<td>-33%</td>
<td>(80)</td>
<td>-47%</td>
</tr>
<tr>
<td>Industrial Products</td>
<td>$736</td>
<td>15%</td>
<td>341</td>
<td>13%</td>
<td>$305</td>
<td>71%</td>
<td>65</td>
<td>24%</td>
</tr>
<tr>
<td>Intermodal</td>
<td>$1,400</td>
<td>28%</td>
<td>1,216</td>
<td>46%</td>
<td>$596</td>
<td>74%</td>
<td>299</td>
<td>33%</td>
</tr>
<tr>
<td>Automotive</td>
<td>$323</td>
<td>7%</td>
<td>141</td>
<td>5%</td>
<td>$19</td>
<td>6%</td>
<td>(25)</td>
<td>-15%</td>
</tr>
<tr>
<td>Other Revenues</td>
<td>$117</td>
<td>2%</td>
<td>-</td>
<td>-</td>
<td>$(85)</td>
<td>-42%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$4,932</strong></td>
<td><strong>2,645</strong></td>
<td></td>
<td></td>
<td><strong>$1,233</strong></td>
<td><strong>222</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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45 All figures drawn from CP Annual Report - 2008
### Highlights:

| Intermodal | • CP’s largest business segment at 28% of revenues and 46% of volumes  
|            | • Fastest growing business segment since 2001 |
| Forest Products | • Smallest of CP business segments at 5% of revenues and 3% of volumes  
|                | • Revenues down by a third and volumes by nearly 50% since 2001 |
| Grain | • Consists primarily of western Canadian export grain moving through the ports of Vancouver and Thunder Bay. |
| Industrial Products | • Includes chemicals, plastics, metals, aggregates and mining and energy-related products |
| Sulphur & Fertilizers | • Sulphur originates mainly in southern Alberta moving to export markets through the Port of Vancouver  
|                     | • Fertilizer traffic consists principally of potash traffic originating in Saskatchewan moving to export positions via west coast terminals |
| Automotive | • Consists of finished vehicles and automotive parts traffic  
|             | • Transport both domestically produced vehicles and import vehicles arriving at Vancouver |
| Coal | • Primarily metallurgical coal destined for export through Westshore Terminals at the Port of Vancouver destined to the Pacific Rim, Europe and South America for use in steelmaking. |

### 2.3 Changes in Railway Markets

When viewed in total for both their Canadian and U.S. operations; changes in the mix of the railway traffic base have been significant over the last decade. In particular, there has been a reduction in the importance of bulk traffic and growth in intermodal and merchandise traffic.\(^4\)

Intermodal traffic has been the fastest growing business segment for CN and CP over the last 10 years experiencing 37% growth and now representing 36% of total rail traffic. By comparison bulk traffic has declined by 6% based largely on declines in coal handlings for both railways. Intermodal growth has been spurred most significantly by the tremendous growth experienced in recent years in import traffic principally via the Port of Vancouver.

Other noteworthy trends in traffic patterns over the longer term include the decline in grain volumes that previously moved via Thunder Bay and through the St. Lawrence Seaway system to markets in Russia (the former Soviet Union) and Europe and the greater importance today of grain export markets in Asia served via the West Coast. In the future, the growth of the domestic economies of the so-called ‘BRIC’ nations of Brazil, Russia, India

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\(^4\)The growth of merchandise traffic shown in the graph below beginning in 2004 is driven largely by CN’s acquisitions in 2004 of BC Rail and Great Lakes Transportation. These two purchases by CN added significantly to their forest products traffic in the case of BC Rail and their metals and minerals business in the case of Great Lakes Transportation.
and China may have an effect on the relative importance of trade flows via Canada’s east and west coast ports however, to date the effect of the growth of these nations is not apparent in changes in the flow of rail traffic other than the growth of intermodal noted earlier.

2.4 Comparison to Other North American Railways

Canadian National and Canadian Pacific are Canada’s only two major railways and dominate the rail freight transportation system in Canada. They are of sufficient size to be categorized as Class I railways using revenue standards applied by the U.S. Surface Transportation Board and with their U.S. subsidiary operations are truly continental in their operations. However, they are by most any quantitative measure used significantly smaller than almost all of their U.S. counterparts. Whether examined on the basis of freight revenues, carloads, employees, gross ton miles, capital investment, or rail infrastructure CN and CP rank fifth and sixth respectively among North American Class I railways in all instances but one.
This section of our report will compare and contrast CN and CP to the four largest U.S. Class I railways across a range of operational, financial, and market criteria. Our comparison excludes Kansas City Southern Railway as publicly available information for KCS does not lend itself easily to comparison against the other railways for a number of key operating and market related metrics.

### 2.41 Scope of Operations and Physical Assets

The relative size of railways can be examined by comparing their operational workload and asset base as measured by gross ton miles, number of employees and physical rail assets owned and or operated. When we compare the Class I railways on this basis we can see that with the exception of route miles where CN with a network of some 21,000 miles ranks third among North American carriers, CN and CP are the smallest of the six railways by every operational and asset measure. In most categories the largest U.S. carrier is anywhere from two to five times larger than CN - the larger of Canada’s two railways.

**Highlights:**

1. As measured by gross ton miles Burlington Northern Santa Fe Railway is the largest railway. With 1.1 trillion GTMs in 2008 it is approximately 10% larger than second ranked Union Pacific Railway and more than three times larger than CN.

2. BNSF, with more than 32,000 route miles operated has the largest rail network among the carriers although it achieves this standing by virtue of more than 8,000 route miles of trackage rights on other railways. If measured on route miles owned Union Pacific is the largest.

3. With more than 48,000 employees Union Pacific employs more people than any other railway in North America. This is more than twice as many as CN and three times as many as CP.

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47 Source: Annual Reports 2001 - 2008

48 Total 2008 Route Miles including owned and leased trackage and trackage rights.
4. Union Pacific, with a fleet of more than 8,400 locomotives operates the largest locomotive fleet of all the railways. Its fleet is 30% larger than 2nd ranked BNSF and four and a half times larger than CN’s.

5. Norfolk Southern, with more than 94,000 freight cars operates the largest car fleet among the North American carriers with CN and CP ranking a distant 5th and 6th with fleets of 79,000 and 54,000 respectively.

Figure 23 2008 Gross Ton Mile Statistics

![Figure 23](image-url)

Figure 24 2008 Average Employees

![Figure 24](image-url)

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40 Source: Annual Reports 2001 - 2008

QGI Consulting
Description of Canada’s Rail Based Freight Logistics System
2.42 Capital Investment

Railways are capital intensive businesses that must constantly invest in asset renewal in order to remain competitive in their product offerings and maintain safe operations. While railways invest capital in a number of areas including information technology, freight cars, locomotives and railway buildings and facilities the majority (60-70%) is spent on maintaining and improving track infrastructure. It is therefore not surprising that the level of capital investment by these railways correlates closely to the size of their networks – i.e. the largest railways (BNSF and UP) spend the most capital in absolute dollars while the smallest (CN and CP) spend the least.

In 2008 the six largest Class I railways in North America invested a total of $10.6 billion with Union Pacific making the largest investment at nearly $2.8 billion. Capital investments made in 2008 were $2.3 billion or 27% higher than the average investment level of $ 8.4 billion over the previous five years. CN and CP invested a total of $2.5 billion which also marked a 20% increase over the previous five year average.

The ranking of the carriers in this area changes only slightly if we look at investment as a function of relative network size. This can be done by comparing the level of capital investment per route mile of track owned. As can be seen in Figure 26 below the rankings at the top and bottom remain unchanged with only CSX and NS switching positions.

50 CN and CP investments stated in Canadian funds as reported in their respective annual reports.
The relative level of investment by CP becomes dramatically evident when measured as a percentage of operating income as seen in Figure 27 below. CP, while being the smallest of the six railways and the one that spends the least total capital in absolute dollar terms, is the carrier that spends the greatest percentage of its operating income (94%). It is noteworthy that CN while spending the second most capital of all carriers when measured as a percentage of gross revenues spends the least when calculated as a percentage of operating income. This is consistent with CN’s vastly superior operating ratio as compared to its competitors where it is five percentage points better than its closest rival NS and nearly thirteen points better than CP.51

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51 Based on full year 2008 operating ratios as reported in individual railway annual reports

QGI Consulting
Description of Canada’s Rail Based Freight Logistics System
2.43 Productivity and Efficiency

Given the capital intensive nature of railways the efficient and productive use of their assets is critical to their financial success. While the most commonly discussed measure of efficiency in the railway industry is the operating ratio railways publish and compare themselves to their industry peers on a number of such measures.

Figure 28: 2008 Operating Ratios of North American Class 1 Railways

![Bar chart showing 2008 Operating Ratios of North American Class 1 Railways]

CN has become the most efficient railway as measured by operating ratio. The company has led all North American Class I railways in this category for a number of years and remains the industry leader today with an operating ratio of 65.9. As we can see in Figure 28 above Norfolk Southern and CSX have significantly improved their operating ratios in recent years lowering them by 15% each. CP ranks fifth among the top six railways in this category and is the only carrier whose operating ratio has increased since 2001.

Another measure of operating efficiency commonly used by railways is operating expense per gross ton mile. As Figure 29 below shows CN and CP are middle of the pack on this metric with BNSF and Union Pacific about 20% better than the two Canadian railways. Notable is the fact that while all carriers have seen their cost per unit of work rise since 2001 CN and CP have significantly outperformed their U.S. counterparts in the management of these cost increases.

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52 Total workload (gross ton miles) differs from revenue earning workload (revenue ton miles) in that the former includes mileage and tons associated with non revenue movements such as the movement of empty cars.

53 The operating ratio is a financial term defined as a company’s operating expenses as a percentage of revenue.

2.44 North American Class I Market Profiles

As we noted earlier each railway tracks and reports its revenues using industry sector or business unit descriptions and definitions that reflect the structure of its business. In comparing and contrasting the market profiles of the six major carriers we will look at the significance of each of the three major business lines for the carriers.

Intermodal

Intermodal is a significant business sector for all the Class I carriers and regardless of whether it is ranked on revenue or volume (carloads) it is either the largest or second largest business unit for all railways. It is the largest volume segment for all carriers as measured by carloads (units) handled. However, when measured on the basis of revenues it is the largest business line for only 3 of the 6 carriers – CN, CP, and BNSF.

We can see in the table below that when compared to their U.S. counterparts, with the exception of CSX where they are comparable on a revenue basis, CN and CP are relatively small players in this market. However, CN and CP are comparable to BNSF on a revenue per unit basis. This reflects the similarities in their intermodal networks and franchises characterized by long haul transcontinental movements particularly for import and export traffic originating and terminating at west coast ports – Vancouver for CN and CP and the ports of L.A. – Long Beach and Seattle for BNSF.
### Intermodal Business Overview – North American Class 1 Railways

<table>
<thead>
<tr>
<th></th>
<th>BNSF</th>
<th>UPRR</th>
<th>NS</th>
<th>CSX</th>
<th>CN</th>
<th>CP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 Revenues (Billion)</td>
<td>$5.551</td>
<td>$3.023</td>
<td>$2.058</td>
<td>$1.466</td>
<td>$1.580</td>
<td>$1.400</td>
</tr>
<tr>
<td>Percent of Revenues</td>
<td>32 %</td>
<td>18 %</td>
<td>19 %</td>
<td>13 %</td>
<td>21 %</td>
<td>29 %</td>
</tr>
<tr>
<td>2008 IM Units Handled</td>
<td>4.674</td>
<td>3.165</td>
<td>3.029</td>
<td>2.069</td>
<td>1.377</td>
<td>1.216</td>
</tr>
<tr>
<td>Percent Total Carloads</td>
<td>47 %</td>
<td>34 %</td>
<td>41 %</td>
<td>31 %</td>
<td>30 %</td>
<td>46 %</td>
</tr>
<tr>
<td>Average Revenue / Unit</td>
<td>$1,188</td>
<td>$955</td>
<td>$679</td>
<td>$709</td>
<td>$1,147</td>
<td>$1,151</td>
</tr>
</tbody>
</table>

**Bulk**

It is estimated that bulk products, consisting principally of coal, grain and other agricultural products, sulphur, and fertilizer products represent approximately 40-42% of revenues and 30 – 36% of carloads for all carriers other than CN. As was noted earlier CN stands apart from other railways in its market diversification where no single business unit represents more than 19% of revenues.

Figure 31 below provides an estimate of the significance of bulk commodities for each of the six major railways. These values have been estimated using business unit revenue and volume figures reported in each company’s 2008 annual report. It is recognized that the carriers group their commodities somewhat differently and that in some instances individual commodity detail is not available in publicly available information. This notwithstanding we believe these values to be representative.

### Highlights:

- For the four U.S. carriers coal is the dominant bulk commodity representing 50 – 75% of total bulk revenues as compared to CN and CP where it represents less than 30%
- CN is the least bulk intensive of the six carriers with this business segment representing only slightly more than 20% of revenues and volumes
- BN and UPRR are very similar with respect to the importance of bulk within their overall business with bulk representing 41% of revenues and 36% of volumes for each carrier
- Bulk revenues for BNSF are equivalent to 88% of CN’s total revenues and 150% of CP’s total revenues.
- CP has the highest revenue per carload for bulk traffic at nearly 20% higher than the average of the other five carriers.
Merchandise

Merchandise traffic includes all commodities that are not accounted for by the bulk and intermodal segments including forest products, minerals, metals, chemicals, petroleum products, and automotive traffic.

Highlights:

- CSX generates the highest revenue of all the railways from its merchandise traffic although when measured as a percentage of total business this traffic segment is most important to CN where it represents 50% of revenues and 49% of carloads.
- Union Pacific lays claim to the largest Automotive franchise among the carriers with revenues exceeding $1.4 billion in 2008.
- Consistent with the dominance of intermodal and bulk traffic at CP; its merchandise business is small by comparison to the other carriers representing only 26% of revenues and 22% of carloads.
- CN has the lowest revenue per car of all the carriers.
3. Forces Shaping Railway Decision Making

3.1 Capital Intensity

The financial integrity of railways has long been a preoccupation of both railways and policy makers. Canada’s railways’ history of financial failures, consolidations, nationalization and re-privatization (in the case of CN) has resulted in extensive public policy debate about the financial integrity of the rail system in Canada.

During the most recent broad review of transportation regulation in Canada – the Canada Transportation Act Review of 2000 – 2001 (CTAR), concerns about risks to the future financial integrity of the rail system were extensively examined. Most examinations of railway financial integrity emphasize the capital intensity of the railway industry and the long time horizons associated with railway capital investment. Capital intensity is generally defined as the proportion of capital inputs required by a firm in comparison to all other inputs, especially labour.

![Figure 33: Capital Intensity: 1999 - 2007 Select Canadian Industries](image)

When compared to other industries in Canada it is clear that the railway industry requires a much higher relative capital input than that of some of its customers. However, it has much lower capital intensity than the utilities

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63 Minister of Public Works and Government Services Canada.

industry and is comparable in this regard to one of its major customers, the mining industry. When the capital demands on the railway industry are examined in relationship to the operating income available to fund capital investment, the following picture is revealed.

Figure 34  Average level of capital investment as a percentage of operating income

The above graph demonstrates that many of the railways’ customers have similar demands on their operating income to fund on-going capital investment. Of particular interest is the mining industry which invested in excess of 100% of its operating income on capital requirements over the years 1999-2007. These comparisons to other industries do not minimize the concerns that have been raised over the years regarding the financial self-sufficiency of railways but only provide additional context. As was noted by the CTAR panel, due to the long-lived nature of railway assets, if a railway is subject to under-investment, a considerable period of time can pass before the decay in the system becomes evident and years of re-investment may be required to make up for the deficiencies. Given railways’ role as enablers of commercial activity and especially of international trade, the maintenance of their financial health should be an important priority for policy makers.

As is illustrated by the following chart, policy makers’ concerns about ongoing levels of railway capital investment reflect the reality of railways’ history in Canada.

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64 Statistics Canada and Railway Association of Canada
When capital investment is compared to the level required to simply maintain the railways’ capital stock, for much of their history since the middle of the last century railways have been undergoing a period of disinvestment. However, this was also a period of significant network rationalization as the railways consciously moved to focus investment on their core networks and reduce their branch lines. The recent trend towards capital sufficiency however must continue as it is likely that the benefits of network rationalization will not give the same benefits to Canada’s railways in the future as they have in the past.

Railways have long complained that the taxation treatment of their capital investments increases their risk aversion with respect to capital investment as the time horizons for amortization of these investments was – in the railways’ view – inappropriately long. Some of railways’ concerns regarding the taxation treatment of their capital have been addressed in recent years as the capital cost allowances for amortizing important classes of investment such as locomotives and railcars have been raised to 30% and 15% respectively (2008 Federal Budget). However, railways still believe that this leaves them at a competitive disadvantage to trucking companies who benefit from a 40% rate on truck tractors and a 30% rate on trailers.

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65 Statistics Canada Table 031-0002
3.2 Competitive Environment

Railways have been progressively deregulated over the last three decades and now operate relatively free from constraint in their commercial relationships with their customers. Only in the case of western Canadian grain do railways face regulatory restrictions on their commercial activities. In discussions about railway competition in Canada, three types of competition are normally identified: intramodal, intermodal and market competition.

Intramodal competition refers to competition between railways for a customer’s freight. Direct rail competition exists when more than one railway has direct access to the shippers’ traffic or such access is available through regulatory provisions – especially interswitching. The CTAR survey of shippers suggested that up to 40% of Canadian shippers had access to direct rail competition. Indirect rail competition will exist where a shipper or receiver does not need to ship from a fixed location but can move their product by another mode (truck, pipeline or water) to an alternate loading or unloading location to take advantage of nearby railway competition. In the case of grain, indirect intramodal competition is readily obtained as grain is always trucked from the farm to a railloading location. The CTAR survey of shippers indicated that at the time of the review 64% of grain was subject to effective indirect rail competition. However since that time grain company elevator rationalization has reduced the number of elevators by over 60% thereby reducing the proportion of grain producers who have access to rail competition.

For other commodities, shippers often make significant logistics investments in order to establish or take advantage of indirect rail competition. In the case of lumber, shippers have been trucking to independent truck-to-rail reload locations at or near U.S. border points in British Columbia, Ontario and Quebec for over 20 years to take advantage of American railway competition. In addition, lumber reloads have been established by forest products firms in Canada at locations that introduce rail competition not available at their mill locations.

However, for shippers of many commodities, the establishment of multi-modal systems to take advantage of potential indirect rail competition is impractical. Some merchandise products such as woodpulp, newsprint and panel products are subject to damage if multiple handling is required to accomplish re-load activities. For many chemical and petroleum products the infrastructure required to enable re-handling the products would be prohibitively expensive. Particularly for dangerous commodities, truck transportation and re-handling introduce additional risks as well as costs. While the use of indirect rail competition for these products is possible, the extra costs required to protect products from environmental and physical damage in the re-handling process and to compensate for truck movement costs require very high rail freight rate differentials. Only in cases where a competing rail carrier has a significant cost advantage due to shorter routing or other operating factors is a shipper...

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60 Division VI of the Canada Transportation Act sets out the regulations regarding the maximum revenue entitlement of prescribed railways for the transportation of grain in Canada. These regulations define the formula for calculating the total revenues that can be earned by the railways but do not establish limits on the setting of individual freight rates for the movement of grain.
of commodities that require special handling likely to be able to take advantage of indirect competition at advantageous freight rates. Railway marketers can effectively estimate the logistics costs required for a shipper to take advantage of indirect rail competition and ensure that rates are established at levels which restrict the attractiveness of such options. While this acts as a limit on railway pricing, the rate differentials between the two options can remain high reflecting the additional costs required for a shipper to utilize the multi-modal indirect rail option.

For high volume bulk commodities like coal the movement of truck traffic that would be required via public highway would be unacceptable to other roadway users and unlikely to be economic. There are few locations in any case where the production of such commodities is located such that multi-modal transportation systems are feasible. Therefore, while indirect rail competition is available in limited cases for a limited number of commodities; the characteristics of many products restrict the practical availability of such competition. The CTAR survey of shippers found limited evidence of the use of such competitive logistics arrangements in the Canadian rail marketplace.

*Intermodal competition* exists where a railway customer has access to a cost effective competitive mode such as trucking or marine. For merchandise commodities direct truck competes with railcar and with railway intermodal services in a number of markets. In general, commodities that are amenable to re-handling or that can be effectively loaded in intermodal containers can be trucked competitively for distances up to approximately 800 km.

However, rail can be more competitive than trucking over shorter distances and trucking can be the lowest total cost option for longer distances. In general, commodities which move in very high volumes by bulk and/or that are very heavy are moved more efficiently by rail than truck. This would include some steel products, cement and building aggregates and ores and mineral products. Very high value and light commodities can be moved more competitively by truck than rail over longer distances. In addition, products that require special handling due to their fragile nature or the need for temperature control can also be moved by truck over relatively longer distances than lower value products and products that do not require special handling.

Marine competition requires geographic access and can be used in combination with other modes such as marine rail combinations. The use of the St. Lawrence Seaway for the movement of bulk products is the major example of marine competition with railways in Canada.

*Market Competition* refers to a situation where a railway’s freight rates and service levels may be limited by the effect of transportation costs on the rail shipper’s ability to remain competitive in the destination market for the product. This is a particularly important source of competition for lower valued commodities. A good example of this is the market for dry sulphur which is a by-product of natural gas production. Sulphur is used primarily in the production of fertilizer in export markets. Transportation costs for sulphur can make up a very high proportion of the delivered cost of the product and determine whether or not the product is shipped to market or
stockpiled at the production locations in western Canada. For a railway, the theoretical floor price for such freight rates will be equal to the price of the commodity at the port, less the shippers estimated cost of production and rail loading plus the return required to keep the shipper indifferent to shipping the commodity. The remaining economic rent on the commodity can be realized by the railway through their freight rates. In practice, the situation is more complex as the railway may also need to take into account the risks of the customer pursuing rate relief through the shipper protection measures in the Canada Transportation Act – such as Final Offer Arbitration. In addition, the railway must be concerned about the shipper’s ability to move the same product from a different rail origin via a different carrier to the same destination market.

A somewhat different type of market competition exists where the effect of freight rates on the delivered cost of a product may induce purchasers of that product to shift to a substitute product. An example of this arises from time to time in the competition between coal and natural gas as industrial fuels. If the delivered price of coal, which includes rail transportation costs, can be kept below the relative cost of natural gas then in some circumstances one fuel can replace the other in facilities that have the ability to switch between fuels.

It is important to note that in situations where market competition establishes the ceiling on railway freight rates, it implies the absence of effective intramodal or intermodal competition. It is in situations like this that shippers are most concerned therefore about railways’ potential for abuse of market dominance and where the use of shipper protection measures such as Final Offer Arbitration are most likely to be employed by shippers.

### 3.21 Competition by Commodity and Region

An important factor in the examination of rail competition in Canada is the range of competitive alternatives available to shippers of different commodities, in different regions. The chart below provides an illustration of the most prevalent type of competition for each of the major commodity groups, by originating province or region in Canada. Any attempt to simplify what is in reality a complex relationship of moving parts is certain to result in controversy and spirited debate. However, the study team has applied its extensive experience in rail transportation to the assessment of the competitive characteristics of each commodity group and region. The team also had available data from the railways indicating the extent of direct rail competition at each origin for all major flows of Canadian originated rail traffic. Further, the chart accurately reflects the distribution of Canadian originated rail tonnage by region and is directly based on railway data sources. While the competitive characteristics of the traffic at both the origin and destination are important, this summary uses the competitive status of the origin location to classify the competitive context as the ability of the shipper and the carrier to influence competition is most strongly leveraged at the origin location.

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67 This assumes that this rate level is above the railway’s marginal cost as a railway will not in most circumstances quote rates below their marginal costs.
In Figure 36, the size of the bubbles indicates the relative size of the rail commodity group in each of the originating regions. Each bubble’s size is proportional to the total share of Canadian rail tonnage that is represented by each commodity group and region combination.\(^{68}\) Thus the largest commodity / region combination is represented by bulk products originating on the Prairies. The dominant type of competition is listed first and the relative importance of other types of transportation competition is shown below with the size of the titles indicating the relative importance of the type of competition. For example, for Merchandise traffic originating on the Prairies, Indirect Rail and Rail Direct competition are the two most important sources of competition and Market competition is a less important competitive factor.

### Figure 36  Railway competition in Canada by commodity and originating region

<table>
<thead>
<tr>
<th>Originating Region</th>
<th>British Columbia</th>
<th>Prairies</th>
<th>Ontario</th>
<th>Quebec</th>
<th>Atlantic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Merchandise</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Rail</td>
<td>Rail Direct</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail Direct</td>
<td>Market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermodal</strong></td>
<td>Rail Direct</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rail Direct</td>
<td>Modal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grain</strong></td>
<td>Indirect Rail</td>
<td></td>
<td>Indirect Rail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market</td>
<td>Rail Direct</td>
<td></td>
<td>Rail Direct</td>
<td>Modal</td>
<td></td>
</tr>
<tr>
<td><strong>Fertilizer</strong></td>
<td></td>
<td></td>
<td>Market</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bulk</strong></td>
<td>Market</td>
<td></td>
<td>Rail Direct</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Automotive</strong></td>
<td>Rail Direct</td>
<td></td>
<td>Indirect Rail</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chart shows that direct rail competition is found most often in the merchandise commodity groups in central Canada and to a lesser extent in western Canada. For the railways’ intermodal services, rail direct competition predominates in long haul markets while modal competition is very important in shorter haul corridors and markets. For grain and bulk commodities, indirect and market competition are the dominant competitive dynamics with the exception of the important potash segment within bulk in the Prairie Provinces, where there is direct rail competition at most origin locations.

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68 The sizing of the bubbles on the chart is based on the originating tonnage of the commodities in the province or region. If the proportion of rail volume was based on either freight revenue or number of carloads it would tend to decrease the relative size of the bulk, grain and fertilizer products and increase the relative size of the intermodal, merchandise and automotive groups’ symbols.
However, in addition to the type of competition for railway shippers’ business it is important to determine whether or not effective competition exists. Particularly for transportation markets where economically feasible alternatives to rail transportation may not exist (high volume bulk products and grain) and therefore where railway market power is high, the existence of direct or indirect competitive alternatives may not lead to railway service and pricing behaviours that reflect effective competition.

The CTAR panel recognized that it is important to assess not only whether access to competition exists but also whether or not competitors’ behaviours result in the existence of real competitive options for shippers. Based upon the panel’s research into this issue and the consideration of several technical and economic measures, the CTAR panel concluded that:

“Canada’s rail system is not inherently anti-competitive; nor is market abuse systemic or widespread. Indeed, by all available indicators, most shippers in most markets in most parts of the country are well served.”

The main factors cited by the CTAR panel in reaching this conclusion were that: railway profits were not excessive, freight rates for all commodities except grain had declined between 1988 and the time of the report (2001) and that available competition indicators revealed that the system was “reasonably competitive.”

As regards the first two factors cited by the CTAR panel, the graph in the figure below shows that while average railway rates did decline in real terms over the period cited, they have stabilized since that time. Furthermore, operating income per revenue tonne kilometer has been on a strong upward trajectory.

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70 Vision and Balance. Page 57
It is beyond the scope of this paper to determine whether or not the conclusions about the extent of rail competition in Canada reached by the CTAR panel should be reviewed based solely on an examination of these two factors. However, the trend in average rate levels observed by the panel appears to have changed since the time of the CTAR review and recent productivity gains by the railways have generally not been passed on to shippers.

### 3.3 Railway Demand Management Strategies

In situations where railways face restrictions on their capacity, how they manage their networks may be dependent upon the competitive characteristics of the affected traffic. Railway capacity is provided primarily by a combination of track structures, traffic control systems, rolling stock assets and human resources (particularly train crews). In the short term, all of these capacity factors are fixed for a particular railway. There are management strategies that can be used by railways to improve overall network capacity or to provide relief for traffic caught in a bottleneck, such as running rights or haulage agreements with other railways to move traffic around congested areas. In the case of severe disruption that only affects one carrier, such arrangements are implemented whenever possible and when the roads involved can agree on suitable financial compensation.

For longer term or more widespread cases where railway capacity is limited, railways have other means of dealing with capacity limitations. An attractive strategy from a railway’s perspective is demand smoothing. This refers to

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71 Railway Statistics 2008. Railway Association of Canada
any action taken by the railway to spread a given demand for transportation over a longer time period to allow volume peaks to be handled with a lower available capacity. Where rail traffic must move in a specialized type of railcar, a railway will be reluctant to invest in sufficient railcar capacity to handle peaks in traffic if this traffic can be spread over a longer time period and handled by fewer cars. A good example of this is railways’ investment in rail cars to handle grain traffic. Demand for grain transportation customarily peaks in the October – December and then again in the April – May periods each year. If railways invested in rail car capacity to handle all of the traffic offered during these peak periods they would have surplus rail car capacity through most of the year. If the railways believe that grain demand can be deferred somewhat, they will invest in capacity that intentionally pushes some demand beyond the grain customers’ peak demand period. Competitive considerations will determine railways’ level of investment in capacity as will the special circumstances of the statutory revenue cap that the railways face for the movement of many western Canadian grain products.

In general, this type of approach can be applied to demand for any of the products handled by railways. However, for some commodities, the circumstances of demand in the railway customers’ final markets will affect where railways might believe that it is possible for demand to be deferred, or smoothed out over time. Two distinctly different commodities in this regard would be dry sulphur, and liquefied petroleum gas (LPG). Most dry sulphur moves from inland stockpiles to port stockpiles and then via large ocean vessels to stockpiles at destinations around the world. Deferring some of the demand for sulphur transportation may be possible over a number of weeks without materially affecting sulphur customers’ ability to meet sales or delivery commitments at final destinations. The LPG that is moved by rail in Canada is used primarily as a heating fuel and for many segments of this market very little inventory capacity exists at consumption locations. As the heating season - when these products are in high demand - is limited in length and widely variable depending primarily on weather, demand for the transportation of this type of product cannot be deferred or the demand simply expires. In between these two examples are a wide range of commodity and merchandise products for which transportation demand can be deferred, or smoothed to varying degrees. In general, the higher the value of the product, the greater is the pressure to minimize inventories and the less likely it is that railways and their customers can defer transportation movement to a later period without affecting the overall level of output.

3.31 Demand Management / Conflict with Shipper Interests

It is clear that an incentive exists for railways that face capacity restrictions to provide capacity to those elements of their customer base for which demand cannot be deferred, and where there is the highest level of competition for transportation. However, the impact of demand smoothing through the restriction of available capacity is not the same for the railway as it is for the railway’s customers. In general, a railway risks the loss of freight revenue on the traffic if it does not move traffic during a demand peak and if the underlying demand for the product is thereby reduced. However, for a shipper, failure to move a product during a demand peak may result in the loss
of price premiums that exist in the markets for their products. Railway actions to defer demand may also affect shipper operating processes; increasing inventory costs and possibly manufacturing costs. It may also affect an individual supplier’s reputation or market positioning versus their competitors who may or may not be customers of the same railway. This uneven application of the potential impacts of demand smoothing creates the potential for strident disagreements between railways and their customers over the appropriate level of capacity that should be available to handle peak transportation demand.

Because of the uneven impact of demand smoothing on railway and customer, they may not evaluate the risks of investment in capacity to handle traffic peaks in the same way and this can make railway and shipper disagreements in this area very difficult to resolve.

3.4 Railway Regulation in Canada

3.4.1 Canada Transportation Act

The commercial activities of Canada’s two Class I carriers are governed by the same laws and regulations governing the activities of other commercial entities in Canada. In addition, special economic regulation of their activities is provided for in the Canada Transportation Act (CTA). Within the CTA, Canada’s National Transportation Policy as laid out in section 5 provides a framework for the regulation of transportation in Canada. Section 5 states in part that a competitive, economic and efficient national transportation system can most likely be achieved when:

“(a) competition and market forces, both within and among the various modes of transportation, are the prime agents in providing viable and effective transportation services;

(b) regulation and strategic public intervention are used to achieve economic, safety, security, environmental or social outcomes that cannot be achieved satisfactorily by competition and market forces and do not unduly favour, or reduce the inherent advantages of, any particular mode of transportation;

(c) rates and conditions do not constitute an undue obstacle to the movement of traffic within Canada or to the export of goods from Canada;”

Under the authority of the CTA, the Canadian Transportation Agency (the Agency) is an independent, quasi-judicial tribunal that makes decisions on a wide range of economic matters involving federally regulated modes of transportation (air, rail and marine), and has the powers, rights and privileges of a superior court to exercise its authority. Within the CTA a number of aspects of rail regulation under Part III Division IV that are especially noteworthy are described in the sections below.
Conditions of Service and Rates

The minimum standard of service that must be provided by railways to railway customers is defined in sections 113 and 114 of the CTA as “adequate and suitable accommodation” for traffic offered for movement. This standard applies both to facilities and equipment and to the need for railways to offer this standard of service for traffic that may be transferred from one railway to another. In addition, section 113 requires that railways move traffic; “without delay, and with due care and diligence.” In addition to these very broad guidelines governing minimum levels of service, section 113 provides for the establishment between railways and shippers of confidential contracts or other written agreements that may be used to govern the conditions of service as defined under sections 113 and 114.

Sections 117 and 118 govern the requirements for railways to publish their rate levels in tariffs, except for those rates contained in confidential contracts. Section 118 ensures that a railway shall, at the request of a shipper, issue a tariff for traffic to be moved by the railway. In addition to providing for the establishment of confidential contracts covering level of service conditions, section 126 specifically allows railways and shippers to enter into confidential contracts governing rate levels and conditions as well as level of service provisions. The CTA does not contain any provisions that limit the rates that may be charged for movement of shippers’ traffic, with the important exception of export grain traffic from western Canada, which is governed by section VI of the CTA. This special exception will be discussed in more detail in a later section of the report.

Shipper Protection and Competitive Features

Interswitching

Section 127 and 128 of the CTA ensures that any rail shipper that is within a radius of 30 km of a railway other than the railway that directly serves a point of origin or destination can have access to the services of that non-serving railway. The services for movement of customers traffic by a serving carrier to a second carrier under these provisions in the CTA is known as interswitching. Section 128 specifically allows the Agency to prescribe the terms and conditions governing the interswitching of traffic. Under these provisions, the Agency establishes regulated rates that are to be charged by the serving carrier, based on distance between customer and the interchange with the connecting railway. These rates under the provisions of section 128 take into account the average variable costs for the movement of all interswitching traffic and are not to be less than railway variable costs. The establishment of cost-based regulatory rates for interswitching provides a significant expansion of competition between railways that would not otherwise exist for customers who do not enjoy the benefits of direct access to more than one rail carrier.
**Final Offer Arbitration (FOA)**

One of the most important pro-competitive features of the CTA is the availability to shippers of final offer arbitration (FOA). Sections 161 through 169 of the CTA provide mechanisms for shippers who are dissatisfied with the rates charged or proposed to be charged by a carrier to submit the matter in writing to the Agency for final offer arbitration to be conducted by either one arbitrator or a panel of three arbitrators if the parties to the arbitration agree. The CTA specifies the processes, time lines and submission requirements for the arbitration. The arbitrator is required to choose the final offer of either the railway or shipper and in making his determination he is required under section 164.(2) to consider, unless the parties agree otherwise:

“... whether there is available to the shipper an alternative, effective, adequate and competitive means of transporting the goods to which the matter relates and to all considerations that appear to the arbitrator to be relevant to the matter.”

Except where the parties agree otherwise, no reasons are set out in the decisions of an arbitrator and the decision is final, binding on the parties and enforceable as if it were an order of the Agency.

The parties may agree to withdraw a dispute from arbitration and many rate issues that began in FOA proceedings in the past have been settled between the parties before the arbitrator’s decision was finalized. In this way, the FOA process has served as a discovery process that has aided shippers in commercial negotiations - particularly very large shippers of bulk commodities.

**Competitive Line Rates**

Sections 129 to 136 govern the creation by the Agency of regulated rates known as competitive line rates (CLR). A shipper located beyond the 30-kilometre interswitching limit may ask the Agency to establish a rate from the origin serving carrier to an interchange point with a second railway. The CTA establishes the formula for such rates which is based on an interswitching rate plus a rate based on the average revenue per kilometer that the originating railway earns on similar traffic moving over similar distances. Before the Agency establishes a CLR the shipper must complete negotiations with the connecting carrier for the balance of the freight movement and in general such movement must not exceed 50 percent of the total distance the freight will be moved by both carriers. While competitive line rates have been a feature of federal transportation regulation in Canada for over 20 years, the provisions of the CTA that provide for their establishment have very rarely been used.

**Level of Service Complaints**

If a shipper or other affected person believes that a railway is not fulfilling its service obligations as defined in the CTA they may file a written complaint with the Agency. Under the provisions of section 116, the Agency will conduct an investigation and has broad powers to order remedies including requiring the provision of rail cars or construction of railway facilities and they may establish specific service standards for the traffic affected by the complaint. If the traffic is subject to a confidential contract, the Agency is bound by the conditions of that
contract in making its determination. In addition, any rate or service condition established by the Agency as a result of a complaint made under these provisions must be “commercially fair and reasonable to all parties.” However, level of service (LOS) complaints under section 116 only empower the Agency to consider the impact on the party affected by the complaint and they do not in general provide relief for shippers not party to the complaint who may be similarly affected. In this way, the LOS provisions of the CTA are most useful for individual shippers but are much less likely to have application for addressing any perceived systemic failures of a railway to provide service to broadly based groups of railway shippers.

**Recent Amendments to the CTA: Bill C-8**

**Removal of Substantial Commercial Harm Test**

Bill C-8, which received Royal Assent on February 28, 2008, contained a number of important amendments to the CTA. Perhaps the most important from the perspective of improving the relative protection of shippers in service disputes with railways was the removal of the “substantial commercial harm” conditions from Agency considerations in disputes relating to rail service, interswitching rates and competitive line rates. Prior to the passage of C-8, the Agency had to be satisfied before it could impose a remedy in such disputes that the shipper would suffer substantial commercial harm in the absence of such a remedy. This requirement was believed by shippers to be unfairly onerous and its removal may increase shippers’ willingness to avail themselves of the remedies available through section 116 complaints. Some shippers argue that its removal can have the effect of improving railway responsiveness to their direct service complaints by lowering the threshold for the Agency to take action in the event a formal section 116 complaint is issued.

**Incidental Services Disputes**

Also of potential importance to shippers was the addition of section 120.1, which permits a shipper to complain to the Agency in writing if they object to the terms or conditions for the provision of incidental services in a tariff that applies to more than one shipper. The Agency may upon examination of the complaint order new charges or terms and conditions and such orders are to remain in effect for a period not exceeding one year. Section 120.1 (3) establishes the factors to be considered by the Agency in the examination of such complaints.

“(3) In deciding whether any charges or associated terms and conditions are unreasonable, the Agency shall take into account the following factors:

a) the objective of the charges or associated terms and conditions;

b) the industry practice in setting the charges or associated terms and conditions;

c) in the case of a complaint relating to the provision of any incidental service, the existence of an effective, adequate and competitive alternative to the provision of that service; and

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72 Section 112. Canada Transportation Act
d) any other factor that the Agency considers relevant.”

However, Section 120.1 (7) specifies that the provisions of section 120.1 do not apply to rates for the movement of traffic.

**Changes to Final Offer Arbitration**

Section 169.1 added a new provision to the FOA process to allow the parties to arbitration to agree during the process to stay the arbitration and refer the matter to a mediator, which may be the Agency.

Bill C-8 also extended the FOA provisions to groups of shippers on rates or conditions for traffic that is common to the members of the group and on which the shippers make a joint offer that would apply to them all. Through the addition of section 169.2 to the CTA shippers can pursue FOA in groups of two or more; however they must first satisfy the Agency that they have attempted to resolve the dispute through mediation prior to submitting the issue for FOA.

**Transportation of Western Grain**

Division VI of Part III of the CTA contains provisions governing the transportation of specific grain products produced in western Canada and shipped to Canadian West Coast ports and Churchill, for export (not including exports to the United States for consumption in that country) or to Thunder Bay for domestic or export purposes.

The most important feature of this division of the CTA is the establishment of a maximum revenue entitlement that the railways can earn on the carriage of the grain products affected (revenue cap).73

The transportation of western grain products has a long history of regulation and subsidy in Canada. While direct subsidization of grain freight rates ended with the repeal of the Western Grain Transportation Act in 1995, cost-based maximum grain freight rates continued to be established by the Agency until the new regulatory framework, based on the recommendations of the Estey and Kroeger reviews were implemented in August 2000.

The revenue cap and the performance against the cap for each of CN and CP are calculated annually using a formula set out in Section 151 of the Canada Transportation Act. The results of these calculations are published by the Agency each year prior to December 30th. The applicable cap threshold and the cap performance reflect grain transportation activity for the most recently completed crop year.

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73 These grains which are specified in Schedule II of the CTA include the great majority of cereal and oil seed crops and products grown and processed in Western Canada.
Revenue Cap Formula

\[\frac{(A/B) + ((C-D) \times 0.022)) \times E \times F}{\text{Where:}}\]

A is the carrier’s revenue for the movement in the base year;
B is the tonnage moved by the carrier in the base year;
C is the carrier’s average length of haul for the movement of grain in the crop year;
D is the carrier’s average length of haul for the movement in the base year;
E is the tonnage moved by the carrier in the crop year;
F is the volume-related composite price index determined by the Agency.

Within the limitations of the cap, the railways are free to establish rates and service conditions on the export movement of western grain products but they are subject to repayment of any earnings on such traffic in excess of the established maximum revenue entitlement and any penalty that may be specified in the regulations.

3.42 The Competition Act

In Canada, the Competition Bureau (the Bureau) is responsible for administration and enforcement of the Competition Act (CA). In regulated or partially regulated industries such as rail transportation, the Bureau has a complementary role along with regulators, such as the Agency, in promoting and maintaining competition.

Competition law differs from industry specific regulation such as that provided for by the CTA in that it establishes the broad rules by which businesses must operate, unless they are exempted from the general competition law by industry specific laws. In the past, under the legislative predecessors to the CTA, competition law was often argued to not apply to transportation because of this concept of sector specific regulation overriding the application of general competition policy. However, as stated by the Commissioner of Competition in his fall 2000 submission to the CTAR Panel:

“The application of the RCD (regulated conduct defence) is circumscribed by the Canada Transportation Act (CTA). This was due to a provision (ss 4(2)) added in 1996 indicating that nothing done under the authority of the CTA affects the operations of the Competition Act.”

Competition law promotes the use of market forces to determine economic behavior and govern market decisions. Direct economic regulation such as that provided for in certain sections of the CTA can replace market driven decisions in cases where there is a perceived failure of market forces to achieve effective competition and efficient market behavior. However, in cases of market dominance arising from situations of ‘natural monopoly’74

74 In economics, natural monopolies can occur when a single company becomes the only supplier of a particular kind of product or service over time because of the fundamental cost structure of the industry.
competition law does not address possible excessive pricing due to the market power held by a particular competitor. As regards abuse of dominance due to natural monopoly, the Commissioner of Competition in a presentation to the CTAR Panel indicated that:

“Competition law is directed at a person or persons engaged in anti-competitive acts that have the effect, or are likely to have the effect, of substantially preventing or lessening competition. It cannot address typical problems associated with a natural monopolist, such as: high prices, insufficient supply, inadequate service or types of services, high or low profitability, absence of entry into the industry and insufficient investment, etc.”

Section 114 of the CA requires parties to certain types of proposed transactions related to mergers and acquisitions to notify the Commissioner of Competition. Notifiable transactions are those transactions that exceed prescribed thresholds for the size of the transaction or the size of the parties to the transaction.

Upon the application of the Commissioner of Competition, the Competition Tribunal may make an order when it finds that a merger "prevents or lessens, or is likely to prevent or lessen, competition substantially." A substantial prevention or lessening of competition results only from mergers that are likely to create, maintain or enhance the ability of the merged entity, unilaterally or in coordination with other firms, to exercise market power.

If such a condition is found to exist, the Tribunal may order a broad range of actions designed to remedy the reduction in competition. In the case of the purchase of the assets of the British Columbia Railway (BCR) by CN, the Commissioner of Competition, BCR and CN entered into a Consent Agreement as provided for in section 105 of the CA. This agreement recognized that the Commissioner of Competition determined that the proposed transaction created a “reasonable likelihood that CN could use the market power it may acquire as a result of the Transaction to substantially prevent and/or lessen competition in the affected product or geographic markets.” A key objective of the agreement was to establish “specific, enforceable and transparent standards and covenants to prevent anti-competitive behaviour.”

3.43 Railway Safety

Railway safety in Canada is governed by both provincial and federal legislation, rules, regulations and statutes. Whether a railway is regulated by federal or provincial statute is determined by the geographic scope of its railway operations. All railway operations whether freight or passenger that have either inter-provincial or Canada-U.S.

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76 The Competition Tribunal is a specialized tribunal that includes expertise in law, economics and business. It is a strictly adjudicative body that operates independently of government. The Competition Bureau investigates complaints and decides whether to proceed with the filing of an application to the Tribunal.
77 Consent Agreement between The Commissioner of Competition, British Columbia Railway and Canadian National Railway. Registry of the Competition Tribunal. Page 1
78 CB/BCR/CN consent agreement page 2.
operations are subject to federal law. Railways subject to provincial regulation are those whose operations are contained wholly within the boundaries of a single province. Provincial regulation in this area has increased in importance in recent years with the rapid development of Canada’s short line railway industry.

There are currently 34 railways governed by federal regulations in Canada including Canadian National and Canadian Pacific. While the Railway Safety Act is the single most important federal statute in the regulation of safe railway operations others also play an important role. These include the Transportation of Dangerous Goods Act, the Canada Labour Code, the Canadian Transportation Accident Investigation and Safety Board Act and the Canada Transportation Act.

**Railway Safety Act**

Prior to the introduction of the Railway Safety Act (RSA) in 1989 railway safety in Canada was regulated by the Railway Act. The RSA regulates the safety of Canada’s federally regulated railways in a number of areas including the establishment of regulations concerning the construction, operation and maintenance of railway works and equipment. It also establishes the powers of railway safety inspectors and sets out the government’s authority with respect to the enforcement capabilities and penalties.

A mandated review of the RSA was undertaken in 1994 which led to amendments to the RSA in 1999 including a new requirement for railways to establish safety management systems. This was an important development in railway safety in Canada as it established a framework designed to promote collaborative behavior between railways and the regulator (Transport Canada) for the ongoing management of safety risks and the development of safety management strategies. Each federally regulated railway in Canada is now required to develop internal safety management systems within broad guidelines established by the RSA and to permit Transport Canada to undertake performance based auditing of such systems.

**Railway Safety Act Review - 2006**

For several years following the 1999 amendments to the RSA railway safety performance was seen to be improving as the number of railway accidents in Canada declined. However, between 2002 and 2005, the number of railway accidents increased and included a number of high profile incidents in Alberta, British Columbia and Quebec. In response to these high profile incidents and concerns raised by a cross section of industry, government, and public stakeholders the Minister of Transport, Infrastructure and Communities initiated the Railway Safety Act Review in December 2006.

The review was conducted during 2007 by a four member panel appointed by the Minister. Key areas of examination included:⁷⁹

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• enforcement powers with respect to administrative monetary penalties;
• baseline safety requirements ensuring that new rail companies are willing and able to meet minimum safety requirements before starting operations in Canada;
• consistency of rule application given that rules apply to an individual railway company;
• delegated powers to railway safety inspectors directly, bypassing the Minister entirely;
• defining engineering requirements based on the phrase “sound engineering principles” which is undefined within the Railway Safety Act; and
• establishing a complete legislative authority that applies to railways within Canada’s constitutional authority.

In its final report released in March 2008 the Panel found that while the Railway Safety Act and its fundamental principles were sound that improvements could be made in a number of areas. The panel put forth 56 recommendations that addressed a wide range of issues to be acted upon by both regulators and railways. The Panel’s recommendations have led to the establishment of the Railway Safety Act Review (RSAR) Steering Committee consisting of representatives of Transport Canada, industry and unions to oversee the plan for implementing the recommendations. Reporting to the RSAR are six joint Transport Canada – Industry - Union Working Groups charged with developing strategies to address how to implement the recommendations.

3.5 US Railroad Regulation

United States legislation governing the regulation of railroad transportation has similarities with the Canadian regulatory regime in that both countries have only very general definitions of the service obligations that rail carriers in each country owe to their respective shippers. In the United States, Title 49 of the United States Code contains sections that require U.S. rail carriers to provide service “on reasonable request”. In addition, railroads are required to construct and maintain connections to shipper rail facilities and to provide “safe and adequate car service.”

U.S. legislation allows for confidential contracts for most rail freight rates and limited collective rate making amongst railroads for those carriers involved in a joint movement. However, unlike in Canada, a shipper loses recourse to any shipper protection provisions and processes available through the Surface Transportation Board (STB) if rates and services are governed by confidential contract. In addition, many commodities in the U.S. are exempt from rail transportation service regulation as shippers of these commodities are judged to have available satisfactory competitive alternatives and market forces are deemed sufficient shipper protection. These

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80 In Canada, while the shipper protection processes of the CTA apply to traffic that is covered by confidential contract, the final offer arbitration process for rate disputes between shippers and railways in Canada cannot be employed for traffic moving under the terms of a confidential contract. However, rates established through FOA proceedings may be incorporated in confidential contracts with the agreement of the parties. In addition, the terms and conditions of a confidential agreement regarding service obligations are binding on the Agency with respect to level of service complaints.
commodities include all intermodal movements, boxcar traffic, and a wide range of agricultural and merchandise products.

For the non-exempt commodity shippers, there is a complaint procedure somewhat akin to the Canadian process. Under Title 49 section 11701 a shipper can complain to the STB that a railroad has failed in its minimum service obligations. Like the Agency in Canada, the STB can investigate and compel compliance of rail carriers if necessary. Unlike in Canada, the STB can order damages be paid by railroads for failure to meet minimum service requirements. The STB also requires mediation in all rate disputes brought by formal complaint and offers it to the parties of other service disputes. The STB also provides an informal dispute resolution process where they will facilitate problem solving without more formalized mediation.

A key difference between the U.S. and Canadian regimes is that the U.S. regime includes provision for shippers to challenge freight rate levels through STB processes. There are currently two sets of procedures in the United States under which shippers can appeal for review of rail rate “reasonableness” – one for large rate cases and one for small cases. The procedure for large rate cases is complex and expensive with the estimated costs being as much as US $3 million to prosecute and US $5 million to defend. Rates are only to be subject to review in cases where market dominance by the rail carrier can be established. Market dominance is defined by statute in the United States to mean situations where there is an “absence of effective competition from other rail carriers or modes of transportation.”

Unless market dominance can be established, no challenge to rates can proceed. In addition, also under the same statutory authority, if a rate produces revenues of less than 180 percent of variable costs, the railroad is conclusively presumed to be non market-dominant and therefore beyond regulatory intervention.

In assessing the test of market dominance, the parties generally use a stand-alone costing test (SAC). Under SAC, a railroad may not charge a shipper more than what a hypothetical new and efficient carrier would need to charge if such a carrier were to design build and operate a system to service the traffic under examination.

Finally, in the United States there are no regulatory provisions that correspond to the interswitching provisions of sections 127 and 128 of the CTA.

3.51 Possible Changes to US Rail Regulation

Some U.S. shippers have been advocating for many years for changes to U.S. rail regulation to increase protection for shippers and reduce what they view as excessive railroad market power. In 2003 two bills were introduced in the U.S. Congress to address concerns of captive shippers. S.919, the Railroad Competition Act was introduced in

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81 House Committee Transportation and Infrastructure. Hearing on the Status of Railroad Economic Regulation. Testimony of Roger Nober; Chairman Surface Transportation Board. March 31, 2004
82 49 United States Code 10707(a)
the United States Senate and H.R. 2924 was a companion bill introduced into the House of Representatives. These bills included the following provisions:

- Final offer arbitration in rate disputes
- Removal of anti-competitive conduct test in the terminal area access and reciprocal switching provisions of the ICCTA.
- Cap filing fees for rate cases at level charged for civil cases in federal district courts ($150 versus the current approximately $65,000)
- Requirement for railroads to quote rates to the interchange of the shippers choice
- Ability to designate a region as an “area of inadequate rail competition” and the provision of expedited handling of requests for special competitive remedies in such areas using: switching, haulage, FOA, and rate reasonableness reviews.

While these bills were not passed by U.S. Congress, shipper advocates in the United States continue to advocate for increased regulation of railroad commercial activities and new legislation is in the drafting stage and anticipated to be introduced, by Senator Rockefeller who sits on the Senate Commerce Committee, in the very near future that will likely contain some or all of these provisions.
4. The Canadian Rail Logistics System

Canada’s railway network is one of the most efficient in the world when evaluated in terms of its financial performance and cost effectiveness. However, the evaluation of the system cannot be done in isolation from the customers it serves. The rail freight supply chain extends back to the shippers and their suppliers and down through the railways’ receivers to their customers in Canada and around the world.

Key railway processes must therefore be thought of in terms of how well they integrate with and support the corresponding railway customer processes. Transportation is a derived demand, arising from the different value of a customer’s products in two geographic locations. Transportation can also be thought of as a trade enabling service which permits these differential values to be realized by Canadian industry. The planning and operational processes of railways and their customers are deeply intertwined. This leads to the need for a high degree of collaboration amongst rail freight supply chain partners and a need for a high level of awareness of each player’s capabilities, strategies and limitations. Railway operational processes connect directly to shipper and receiver processes through the movement of shippers’ inventory, and through the direct interface of railway crews and equipment at Canada’s mines, mills, ports, warehouses, manufacturing plants and through railway intermodal services to all manner of commercial enterprise in Canada. In all of the operations of the system it is a deeply linked process with railway and shipper activities interdependent upon each other for their effectiveness.

Because of the interdependent nature of shipper and railway planning and operations, effective communication between railways and shippers regarding current operational issues and future demand forecasting, are essential. In both areas, failures in the sharing of information can result in serious problems for both partners. Where demand forecasting information proves to be inaccurate, both shippers and railways may be unprepared to satisfy

On an average day Canada’s freight railways need to coordinate over 1800 train crews at approximately 300 locations running over 1,000 trains.

QGI Consulting
Description of Canada’s Rail Based Freight Logistics System
their joint customers’ requirements. Where operational communication is ineffective, shippers and railways may fail to take appropriate action to minimize the effect of potential service disruptions on their own organizations. Where communication processes between shippers and railways are ineffective, true collaboration cannot exist and the efficiency of the entire rail logistics system will be negatively affected.

4.1 Railway Service Offerings

Railway service is generally structured around three fundamental service types: carload (or manifest), intermodal and unit train. These services reflect the specific needs of different types of shippers and the underlying characteristics of the commodities being shipped and the markets being served.

4.11 Carload Services

Carload traffic moves in either individual rail car lots or in small blocks of less than approximately twenty cars. Depending on the characteristics of the shippers whose traffic is on a carload train, it may be composed of many very small lots of traffic or may be composed of the traffic of only a few shippers each with blocks of single or multiple car types and commodities. Traffic on carload trains will be “blocked” according to the destination of the traffic. Thus, the train will be organized largely by destination with cars grouped so that they can be set out from the train with a minimum of handling en route as the train moves between its origin and destination terminal. Individual railways may choose to design their carload train service to move between major terminals with traffic blocked only for set out at smaller intermediate terminals (i.e. Edmonton – Winnipeg with blocks for Winnipeg, Saskatoon, and Melville). Alternatively, they may try to reduce handling for traffic by establishing long haul “destination” trains (i.e. Vancouver to Toronto, with blocks for Calgary, Winnipeg, and Toronto). The most typical and familiar carload service would typically be designed to operate in a long haul between two points (i.e. Montreal to Chicago or Memphis to Prince George) with a block of traffic that was the specific train’s

One noteworthy challenge faced with carload or manifest train service is the complexity of planning each individual train’s makeup. Aside from ensuring that cars are “blocked” or marshaled in an order that makes the drops and lifts along the train’s route most efficient, extra planning and attention must be paid to the marshalling of a manifest train’s “consist”. Because of the mix of multiple commodities and car types, the marshaling of the train must for safety reasons ensure that certain commodities or car types are separated on the train. Examples of this would be fertilizer and diesel fuel or logs and tank cars that are under pressure.

It is for this reason that manifest trains pose the greatest operational complexity.
“anchor” movement (e.g. lumber from northern BC to Chicago). Other traffic would then “fill out” the train and be “dropped” or “lifted” along the route of the train. This type of traffic is also commonly referred to as “manifest” traffic.

A typical manifest train will be comprised of several commodities and car types and be up to 150 cars (10,000 feet) in length. The commodities that will move in this type of service would include forest products, chemicals & petroleum products, building products, minerals and metals.

4.12 Intermodal

Intermodal service allows traffic to combine the efficiency of railway movement between origin and destination with the flexibility of truck movement between a shipper or receiver’s location and a rail served intermodal terminal. Intermodal trains may carry multiple types of intermodal containers or trailers including full highway trailers (with fixed road carriages) to domestic containers and ISO international ocean containers.

The concept of intermodal rail service is now over fifty years old. Starting in the late 1950’s concurrent with the expansion of the Interstate highway system in the United States, railways recognized the growing competitive threat of the trucking industry and began the development of their intermodal capabilities. Both CN and CP began moving highway trailers by rail, initially on modified standard flat cars, and then as the volumes grew, on purpose designed TOFC (trailer on flat car) cars. At the same time the concept of ocean container service was being introduced leading a shift of some ocean break-bulk traffic into a containerized mode. Container sizes for movement via ocean carrier have been standardized at 20 feet, 40 feet and 45 feet long. As a result, container terminals and vessel owners world-wide have invested in equipment that is designed to lift, move and stow this size of container through attachment points at the extreme corners of the containers.

For domestic services, North American railways developed larger containers with the most common being 53 feet long. These containers include attachment points that match the 40 foot international containers so that they can be handled by the same terminal equipment. However, they do not move on ocean vessels and are kept in

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83 “filling out” a train refers to a railway’s plan to add traffic to a train such that optimal train length is realized.
domestic service. Their greater cubic capacity has led to them being used widely to handle import goods that are trans-loaded at port locations from the smaller international containers. The cubic capacity of two 53 foot domestic containers will in general accommodate the goods that were loaded in three 40 foot import containers allowing for increased efficiency on the domestic leg of the movement to destination. The market demands of both the domestic and international traffic movements has led to Intermodal becoming the largest single service North American Class I railways offer today when measured on a volume basis.

Today intermodal trains are made up of purpose designed and built rail cars. While some trailers continue to be moved by rail in North America, trucking companies, shippers of domestic goods who have invested in their own equipment, and railways who own large fleets of containers and chassis, show a preference for the larger domestic containers. The transformation of intermodal rail cars from modified flat cars to specialized double-stack 1, 3 and 5 slot “well cars” up to 300 feet in length has led to vast improvements in the efficiency of the intermodal line of business. These double-stack capable well cars may only have one set of rail wheels between the cars and cannot therefore be split apart. In regular intermodal train service, groups of intermodal cars will normally be kept together in one “consist” and the train loaded and unloaded trackside by overhead cranes or top-lift machines inside a railway intermodal terminal or at a port container terminal. These improvements in operational efficiency all lend to the railways’ ability to be more efficient than trucking on long haul routes between major intermodal terminals for many types of customer.

Intermodal train service is typically designed for long haul movements such as Vancouver to Chicago or Montreal. Much like a manifest service, traffic will be taken off or added as the trains run through major centers with intermodal terminals. While all types of commodities will be found moving in intermodal service, the preponderance of the freight on domestic movements is food stuffs, manufactured goods and high valued commodities that require specialized handling, though forest products such as lumber can provide important revenue in some back haul movements. Imports in ocean containers will include manufactured goods such as clothing, electronics and other consumer items. Exports in ocean containers are dominated by commodity products such as woodpulp, agricultural products and some metal and mineral products.

4.13 Unit Train Service

A unit train is typically intended to carry a full trainload of a single commodity from one shipper at a single origin to a single destination. This lends itself almost exclusively to bulk commodities such as coal, sulphur, fertilizers

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84 Source: Wikipedia.org  Photograph by Sean Lamb, May 29, 2005
(i.e. potash) and some grain products. Much of the resource industry in Canada uses unit train movement as the foundation of its supply chain strategy to position their products at port locations for export.

A unit train may be made up of up to 120 rail cars of an identical configuration. For products such as coal or sulphur, open top rotary gondolas would be used, while covered hoppers are used in the movement of products such as fertilizer or grain. Most often these cars will be kept together in a “closed loop” type of service – running from the same plant or mine site to the same port terminal for unloading and returned empty. For some unit train movements, railways may leave the same locomotive units on the train all the way through a loading, loaded transit, unloading and empty return loop. Unit trains have become the most efficient means of moving high volume bulk traffic to export position and are one of the primary reasons Canada remains competitive as a global exporter of resource materials. Both shippers and railways have invested extensively in technology that allows for expedited loading and unloading of product and overall supply chain performance.

A rotary gondola car is an open top car with specialized couplings between the cars that allow the cars to be rotated by specialized dumping equipment through 360 degrees without being uncoupled from each other. This dramatically improves productivity in unloading and is the most common way of handling high volume movements of coal and dry sulphur in Canada.

Grain would be an exception to the closed loop practice as some grain traffic will move in unit train service and some in manifest service, depending on the size of the shipments and hence the size of the car block. Because of this varied approach to the movement, railways use a different car allocation approach for grain cars as well.

4.2 Basics of Railway Operations

Despite the variety of service types described above, there are some processes and characteristics that are common to all types of trains. This section will provide an overview of the processes that are used to manage resources and assets required for the movement of all rail traffic.

4.2.1 The Train Plan

Each train operated by a railway operates according to its own specific train plan88. Train plans form the foundation of a railway’s operation and determine the utilization of its assets and resources. With Canada’s two Class I railways, train plans are maintained as part of the railways’ core operating systems and provide a foundation for ongoing railway operations. Included in a train plan is some very specific information about the resource requirements and work expectations for a specific train, which includes:

- the origin yard and destination yard of the train
- a description of the traffic that is to be carried
- stops the train will make along its route to either lift (pick up) or set off (deliver) cars89
- what traffic should be lifted or spotted on the route the train will take
- the time when the train should depart from the origin and the time at each stop and location through which it will pass along its planned route
- what the train’s crew requirements will be (i.e. will there be a requirement for more than a locomotive engineer and conductor) and where crews should be changed along its route
- what the locomotive requirements for a train are90
- where the locomotives should be fueled (if required) along the train’s route

One of the biggest challenges of train planning for a railway is the balancing of crews and locomotive power. On a day to day basis both design plans and operational management must balance the requirement for crews and motive power for trains by location and direction. This must be accomplished within an environment that

88 A train plan can be referred to as a service design, a service plan or a train design. All refer to the same process and outcome of planning the actions and work expectations of a particular train.
89 Train plans will also stipulate the manner in which a trains railcars and traffic are to be segregated. This is referred to as a train’s blocking or marshalling plan. In the simplest design, train blocks will be segregated by the destination. In more complex designs where dangerous commodities may be involved, blocking will include the segregation of different commodities that could be on the same train (i.e. urea fertilizer and diesel fuel)
90 The numbers of locomotives required for a train are normally expressed in terms of the horsepower requirement needed for each tonne of traffic being hauled (HPT). For example, if a train is determined to require a HPT rating of 0.8, it would require 0.8 horsepower per tonne. If a train (including its railcars) was expected to weigh 12,000 tonnes, and the locomotives that were available were powered with 4,000 horsepower engines, that calculation would state that the train requires 2.4 units, or three locomotives to meet its full “train design” specifications. Locomotive requirements are determined by the power that will be required to move a train at its planned length and weight up and down the steepest grade on the train’s route. Other considerations will be the requirement for the locomotives to supply braking power and the need to reach the required speed specified in the train plan, within an acceptable time from a scheduled stop.
includes myriad and competing market demands from the various types of traffic and a labour environment that is stringent in both the hours of duty personnel can legally work and where they can take mandatory rest at the end of a shift.\textsuperscript{91}

While the creation of train plans and setting of train schedules was at one time a monthly or quarterly exercise, current practices see plans changing regularly to meet the variations in traffic flows and changes in market demand. The development of sophisticated train planning tools and access to real time data enable train planners to adapt resource plans to the needs of the traffic and to ensure that assets and resources are in balance and that costs are managed in an optimal fashion.

Train planning at Canada’s railways is supported by computer modeling systems with algorithms that seek to optimize the use of railway assets while meeting market demands for transit service. These systems can use railways’ actual traffic history or forecast traffic to develop recommended train plans that railway planners then review and adjust before implementing into the railway’s operations.

The scheduling of individual rail cars from origin to destination is a consideration with respect to how trains are planned. In other words, the market demands of the traffic that makes up a train’s workload will be an input to the train planning process. This process of individual car trip planning is usually called either “service scheduling” or “trip planning.” Railway systems allow for the identification of how individual rail cars, that may utilize multiple trains enroute from origin to destination must be handled, and what the standards will be for connection at intermediate terminals from one train to another in order to meet the transit standards established by the railway. A railway must balance the optimization of their train operating costs on the impact that train connections for individual cars will have on the performance of different customers’ traffic. Advanced railway systems will show the performance of a rail car versus its trip plan (or service standard) as the car moves over the railway’s network. This allows rail traffic planners at terminals to prioritize traffic where possible to ensure that service standards are met. The movement and re-sorting of rail cars in rail yards for assembly into trains is called traffic classification and the terminal facilities, locomotives and crews required to accomplish this activity are a major source of railway cost. However, as will be discussed in the section on traffic classification processes in terminals below, the options for traffic planners to return traffic that is running late to on-time status are generally very limited due to the physical and cost limitations associated with traffic management in rail terminals.

On a daily basis, the realities of changes in shipper demands, railway performance, and outside impacts such as weather and connecting carrier problems – requires railways to adjust their train plans to ensure that their networks remain fluid and railway assets are efficiently used. Thus, while sophisticated modeling provides the

\textsuperscript{91} Conditions of work for train crews are covered in a later section of the paper.
starting point for railway train planning, on a day-to-day basis there is still the opportunity for operations managers to make decisions to cancel, combine or add trains to their operations to reflect daily market and operating requirements.

4.2.2 Rail Car Equipment

Rail cars come in a variety of types and capacities. Some types of rail cars are provided almost exclusively to shippers by railways that either own or lease the cars. However, other types of rail cars are provided almost exclusively by shippers themselves who can also either own or lease the cars. In addition, in Canada, a high percentage of the cars used to move grain products are provided by the Federal Government and the Canadian Wheat Board and to a lesser extent the provincial governments of the Prairie Provinces.

In general, where a rail car can be used in multiple locations for multiple products it is more likely that railways will accept the risks of ownership of a rail car fleet and indeed will use car fleet ownership as a marketing tool. Where fleets are specialized, or where they cannot be used for multiple commodities without risk of product contamination, then railways will be much less likely to take on the risks of ownership and will expect shippers to provide their own rail cars. In the case of tank cars used by chemical and petroleum product shippers, these cars are provided exclusively by shippers and Canadian railways have limited their tank car ownership to a small fleet of cars that are used to store and move locomotive fuel used by the railway.
### Rail Car Types and Typical Uses

<table>
<thead>
<tr>
<th>Type</th>
<th>Use and Typical Commodities</th>
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</thead>
<tbody>
<tr>
<td>Boxcar – 50 Foot Single Door</td>
<td>Boxcars are used to accommodate the movement of products that require some form of in-transit protection. The primary commodities are woodpulp, panel products, metals and bagged agricultural products. Typically, these products are palletized, braced, or bagged. Boxcars may contain special moveable bulkheads or bracing points to allow loads to be well secured. Air bladders and other forms of cushioning of loads can also be used. Commonly used boxcars range from 50-60 feet in length though specialized auto parts boxcars nearly 90 feet long are also used. For products that can be easily damaged by movement such as newsprint; railcars with cushioned under frames are used. For larger products such as sheets of manufactured wood panel products, wider double doors are necessary to allow loading and unloading.</td>
</tr>
<tr>
<td>Boxcar – 60 Foot Double Door</td>
<td></td>
</tr>
<tr>
<td>Standard Covered Hopper</td>
<td>Covered hoppers are used primarily to handle dry, granular products that flow easily. Product is loaded through top hatches or trough openings and is unloaded through hatches in the bottom of the car that are opened with a gear and ratchet assembly. Standard and cylindrical covered hoppers are used for grains, fertilizers (including potash), sand, and salt. Specialized vacuum unloading covered hoppers are used for the movement of plastic pellets in bulk. Other specialized smaller covered hoppers are used for the movement of cement and ore products of very high density.</td>
</tr>
<tr>
<td>Cylindrical Covered Hopper</td>
<td></td>
</tr>
<tr>
<td>Open Hopper</td>
<td>Open-top hopper cars are used most often to transport loose bulk commodities such as rock, stone and some ores that do not require weather protection but that have good flow characteristics allowing them to be unloaded through bottom hatches. Cars designated as HT are equipped with three or more divided hoppers, and crosswise-opening doors that allow for the discharging of the load between the rails on which the car rests.</td>
</tr>
<tr>
<td>Multi-Level Auto Carrier</td>
<td>These very high efficiency cars are used to transport finished automobiles. They have ramps inside that can accommodate either two levels of vehicles or three depending on the type and height of the automobiles or light trucks or SUV's being loaded. The cars can be linked from end to end using ramps to allow autos to be driven through from one car to the next allowing the loading or unloading of multiple cars. The cars are enclosed on the sides and have doors on the ends that can be opened for loading and unloading but are closed to protect their contents from damage or theft during transit.</td>
</tr>
<tr>
<td>Gondola - open</td>
<td>Products that are loaded in the open, have no requirement for protection such as coal, coke, aggregates, some metal and mineral ores and concentrates that do not flow naturally and must be dumped or physically off loaded using bucket and shovel systems. In addition some metals and structural steels and scrap metals. Gondola cars can be equipped with rotary coupling systems (rotary gondolas) that allow individual cars or small groups of cars to be dumped by being rotated through 360 degrees without being uncoupled. These are used primarily in coal and dry sulphur transportation. Other higher cubic capacity gondola cars are used in the movement of woodchips which are also often unloaded one at a time in rotary dumpers. Specialized gondola cars with covers that can be lifted on and off the car are used for the movement of coil steel that must be protected from the environment.</td>
</tr>
<tr>
<td>Covered Coil Gondola</td>
<td></td>
</tr>
<tr>
<td>Flat - Standard</td>
<td>Large dimension products that must be loaded from the side, are not easily fitted into a contained area and do not need protection or security are shipped using flat cars. Large vehicles, military equipment, mechanical or structural materials of a large scale (girders, beams, and manufactured components of large manufacturing facilities such as pressure vessels also utilize flat cars. Some highly specialized flat cars are used for the largest and heaviest loads moved by railways. Flat cars can also be equipped with side stakes and end bulkheads for the transportation of long logs, poles or shorter pulpwood logs.</td>
</tr>
</tbody>
</table>
### Centre-Beam Flat

The centre-beam flat car is used primarily for the movement of lumber. These cars are generally 71 to 73 feet long and have decks that ensure that lumber packages slope slightly to the centre of the car to stabilize the load. Straps or cables are generally affixed to the car and are secured over the top of the load and on the sides.

### Tank

Products moved in tank cars include:
- Petroleum fuels such as gasoline and diesel, aviation fuels, fuel oil and lubricants.
- Chemical products such as ethylene glycol, chlorine, ammonia, vinyl chloride, caustic soda, and a wide variety of other industrial chemicals.
- Liquefied petroleum gas products (LPG) such as propane, butane and pentanes. These cars and other cars containing pressurized industrial gases will have reinforced walls and ends.

### Intermodal Rail Car

An intermodal rail car is specifically designed to carry trailers and containers by rail. These cars are built to carry more than one container per car but, with one stacked on top of the other. This is made possible by a depressed section that sits between the trucks of the car. Some intermodal cars are linked in multi platform sets with a single set of trucks between the platforms. These multiple well cars can have up to five platforms carrying up to 10 double-stacked containers.

Some well cars can carry either 40 foot international or 53 foot domestic containers. However, for high volume movements of import containers, specialized cars that accommodate only the international ocean containers are used to minimize the distance between intermodal well cars and maximize the number of international containers that can be handled on a train.

### 4.2.3 Customer Rail Car Order Processes

**Carload Traffic**

Most of the supply of rail cars for the movement of carload traffic is provided by the railways from fleets that they own or lease. Both CN and CP have rail car order processes that require customers to order empty rail cars by day of the week and specific car type. Both railways have Internet based systems that allow customers to enter their
rail car orders weeks in advance to assist the railway in planning their empty car distribution. CN requires that customers utilize this system while CP also allows some customers to submit their car orders through CP service representatives, who then enter the car orders into CP’s systems. In both cases, customers can view their car orders via the Internet.

**CN Guaranteed Car Order Program**

CN’s Carload (or Merchandise) traffic car order system includes commitments from the railway to supply a specified number of cars, or CN will pay a penalty of $100 per railcar that it fails to supply on the day promised. Customers may order cars up to four weeks in advance. On a weekly basis, the deadline for customers to enter their car orders is Tuesday at 1400 ET preceding the week for which the railcars are to be supplied. Within 24 hours of receipt of the order CN will confirm either that they can fulfill the order for the day requested or will indicate the number of cars that can be supplied. If a customer reduces their car orders for any day after the cut-off time of Wednesday at 1400 hrs ET prior to the week for which cars are ordered, the customer pays a $100 per car penalty.

**CP Delta Car Order Program**

CP’s Delta system allows customers to order rail cars three weeks in advance and cars can only be ordered for days on which the customer would be scheduled to receive rail service. By the end of the day Monday preceding the week for which cars are ordered, customers must confirm their forecast car demand in the Delta system for all cars ordered for that week. Changes can still be made to car orders up to four days before the scheduled service day, even for confirmed orders. However, if CP supplies cars for a confirmed order and they are not used, the cars will be subject to demurrage charges and extra switching fees if the cars are released empty from the customer and must be moved back to a CP yard.

CP does not provide any confirmation of their ability to meet specific orders nor do they provide any information in the Delta system on the expected proportion of car orders that will be fulfilled. There are no financial penalties to CP for failure to supply a car order in their Delta program.

**Bulk Traffic**

Both CN and CP have direct contact with large bulk shippers for management of trainload quantities of products such as coal, sulphur and potash. Equipment ordering for bulk customers is not done on a shipment by shipment basis as full trainload sets of cars are assigned to these services on periodic basis and re-allocations are made on an on-going basis. The management of empty equipment for bulk transportation demand is an integrated operational activity that begins with annual demand and then updates trainload demand by origin-destination

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92 The deadline for car orders for CN’s newsprint and paper shippers is Thursday at 1400 EST.

93 For grain car orders made through the GCO program, orders are confirmed by Friday of the week prior to the week they will be supplied.
monthly. CP works with a 10 day rolling train demand and has daily contact with its largest customers to update operational status of railway, shipper and terminals. CN works with a monthly operational plan for bulk shippers, which is updated on the last week of the month for the subsequent month. A daily situation report is developed for internal planning amongst the affected departments.

Bulk shippers can suffer from the same operational, weather and market related volatility as other shippers however due to their large volumes this volatility can affect a railway’s entire network and require rebalancing of railway assets. For shipments of dry sulphur, the shippers own or lease the sets of empty rail cars and work with the railways on the disposition of the train sets to meet their ongoing demand. For coal traffic, most sets of empty rail cars are provided by the railway however, depending on market conditions and commercial discussions with the railways, coal customers sometimes provide supplementary train sets of cars that are managed on the shippers’ behalf by the railways.

**Grain Traffic Car Supply**

**CN Western Grain Car Orders**

CN’s western Canadian grain car customers may order cars up to 16 weeks in advance. Most of CN’s customers order through CN’s Internet systems however some customers place grain car orders through direct electronic data interchange (EDI). As with merchandise car orders at CN, the cut-off for orders is Tuesday 1400 ET preceding the week for which the cars are ordered. Unlike with merchandise car orders, grain customers often order in large car blocks of 50 or 100 cars to take advantage of special incentive freight rates on shipments of that size. Also, unlike car orders for carload traffic, the car orders for grain specify the destination corridor of the traffic in addition to the origin location. Grain car orders are confirmed including any reduction in the expected supply by the railway, by Friday morning, for the following week’s orders. Also, unlike for carload traffic, grain car orders are placed for a given week rather than a given day. Through a “Planned Service Report” which is distributed electronically by CN every Friday; shippers are advised of the planned service days for the following week’s empty grain car spotting.

**CP Western Grain Car Orders**

Unlike CN, CP offers its western grain customers a number of products that allow them to reserve empty grain car capacity through advance ordering systems. There are five basic car order products for grain and these systems are supported by CP’s Internet based car order system for grain – DemandTrax.

These products are designed to meet the needs of different segments of the shipper community (i.e. large versus small shippers, export versus domestic corridors). They are differentiated based on a number of characteristics including: applicable shipper reservation or commitment periods, how far in advance cars can be ordered, minimum order sizes, and applicable penalties in the event of shipper or railway non-performance.
Figure 45 below provides a high level comparison of these products across these key characteristics.

Figure 45  Summary of CP Grain Car Order Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Corridor</th>
<th>Shipper reservation / commitment</th>
<th>Advance booking window</th>
<th>(# Cars) Minimum order size</th>
<th>Per car penalties for shipper or railway non performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CP</td>
</tr>
<tr>
<td>BaseMax</td>
<td>Thunder Bay</td>
<td>20 – 32 Weeks</td>
<td>-</td>
<td>56</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>Vancouver</td>
<td>20 – 46 Weeks</td>
<td>-</td>
<td>56</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>E. Canada</td>
<td>5 – 46 Weeks</td>
<td>-</td>
<td>28</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>All Other</td>
<td>5 – 46 Weeks</td>
<td>-</td>
<td>25</td>
<td>$250</td>
</tr>
<tr>
<td>AdvanceMax</td>
<td>Thunder Bay</td>
<td></td>
<td>2 – 8 weeks</td>
<td>56</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>Vancouver</td>
<td></td>
<td>2 – 8 weeks</td>
<td>56</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>Non Export (3)</td>
<td></td>
<td>2 – 8 weeks</td>
<td>25</td>
<td>$250</td>
</tr>
<tr>
<td>FlexMax</td>
<td>E. Canada</td>
<td></td>
<td>2 – 8 weeks</td>
<td>25</td>
<td>$250 (4)</td>
</tr>
<tr>
<td></td>
<td>United States</td>
<td></td>
<td>2 – 8 weeks</td>
<td>25</td>
<td>$250</td>
</tr>
<tr>
<td>TransMax</td>
<td>Vancouver (5)</td>
<td>20 – 46 Weeks</td>
<td>-</td>
<td>3</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>E. Canada</td>
<td>20 – 46 Weeks</td>
<td>-</td>
<td>3</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>United States</td>
<td>20 – 46 Weeks</td>
<td>-</td>
<td>3</td>
<td>$250</td>
</tr>
<tr>
<td>ReadyMax</td>
<td>All</td>
<td></td>
<td>2 weeks</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

(1) Based on penalty / positive bid system in effect for grain weeks 23 – 52
(2) Non export corridors include US, Mexico, Eastern and Western Canada
(3) Penalties the higher of $250 or the accepted bid value
(4) Traffic destined to Vancouver stuffing facilities only

**BaseMax**

This program allows shippers to book advance grain car supply for a minimum of 5 to a maximum of 46 consecutive weeks of a given crop year depending on the shipping corridor. The program is initiated with the release by CP of their available capacity for this program in the first week of August each year. Customers have less than one week to send their written requests for advance car supply to CP who then allocates the available capacity based on the shippers’ past shipping performance and the number of weeks that they have requested capacity be guaranteed.
Car demand must be made in blocks of from 25 to 56 cars depending on the destination market with the export destinations of Thunder Bay and Vancouver set at a minimum of 56 car blocks. Both the customer and CP can “waive” their demand for cars or ability to supply cars up to three times each during the demand year and CP commits to supply the cars within a two week period starting in the customer’s demand week. Penalties of $250 per car apply to each car not spotted in the commitment period (14 days) and the customer will pay $250 per car for each car ordered and not used.

**AdvanceMax**

AdvanceMax allows customers to book car supply from 2 to 8 weeks in advance of shipping. Customers can book 56 car blocks in the Thunder Bay and Vancouver corridors and in so-called commercial corridors which do not include export grain traffic customers can book 25 car blocks through AdvanceMax. For export shipments the AdvanceMax program is divided into two shipping periods that operate under slightly different rules. For commercial corridors program rules are consistent throughout the year.

For weeks 6 – 22 of the grain shipping year which begins August 1, CP provides their capacity outline from 2 to 8 weeks in advance of the grain shipping weeks and customers submit their requests through the DemandTrax system and CP allocates the available capacity to customers. For weeks 24-52 capacity is advertised in the capacity outline from 2 to 8 weeks in advance of the grain shipping week. Customers then submit a “penalty” bid for each car block requested by origin – destination corridor. A penalty bid guarantees CP the payment of the penalty in the event that a customer fails to use any cars allocated through the process. The minimum penalty bid is $50 per car. If customers bid over $3000 per car the balance over $3000 goes to CP as a positive bid and the $3000 remains as the penalty bid. Railway penalties for failure to supply the entire block of cars by Tuesday following the week for which the cars were ordered are a maximum of $250 per car.

Customers are advised through the DemandTrax system of successful bids and shippers are advised each week of the minimum and maximum penalty bids accepted.

**FlexMax**

The FlexMax program can be used to book 25 car blocks to be shipped to eastern Canada or the United States from 2 – 8 weeks in advance and the actual destination corridor does not need to be declared by the shipper until 12 days prior to the shipping week. Cars are bid on by shippers using a pure positive bid system with non-performance penalties for shippers of $250 per car and for CP the greater of $250 or the positive bid value. Allocation is based on the maximum bid amount that customers are willing to pay.
TransMax

This program serves smaller market shippers and provides for minimum 20 week commitments by shippers of 3 or 6 car blocks to be shipped from the customers’ origins to Vancouver, Eastern Canada or the United States. TransMax is not available to customers who have reserved capacity in the BaseMax program. The TransMax program requires customers to submit bids for the crop year by mid-August and cars will be allocated to customers based on the highest penalty or positive bids submitted. Bid amounts must be constant through all the weeks bid.

CP non performance penalty of the higher of $250 per car or the positive bid amount is payable to the shipper if all cars are not spotted by the end of the day Tuesday of the week following the week for which cars were ordered. The customer non-utilization penalty is $250 per car.

ReadyMax

The CP ReadyMax program provides general grain car supply and is available for all CP grain traffic. Car orders are corridor specific and must be made through the DemandTrax system. Cars are requested for shipping two weeks in advance of the intended shipping week. Penalties for CP non-performance do not apply and orders can be cancelled by the shipper up to 1200 CT of the Tuesday prior to the grain shipping week. Orders cancelled after that time are subject to $150 penalty or $300 if the cars are refused for placement or released empty by the customer after placement.

4.2.4 Railway Car Distribution and Control Processes

Canadian railways have distinctly different empty rail car distribution systems and processes for carload and for grain traffic. For carload traffic, the movement of empty cars to customer loading positions is generally done using mixed carload trains that move in scheduled services. Much of the delivery of empty grain cars is accomplished using dedicated empty train service that is designed on an on-going basis to satisfy the demands of the grain industry. While on both railways, some grain car supply is provided by carload trains, the great majority on both railways is provided by trains whose schedules are adjusted on a week to week basis exclusively for the requirements of the grain industry. As discussed above, bulk customers’ car supply is part of their ongoing production planning process with the railways and no special systems are used to distribute empty trainloads used by these customers. The train schedules that move these empty trains are established in cooperation with the special bulk customer operations groups at the railways and added to terminal line-ups as needed to manage the flow between bulk terminals and bulk shippers.

Carload car distribution

The primary objectives of the systems and processes used by railways to distribute empty rail cars are to meet customer shipping demands while minimizing empty car miles and reducing switching required to segregate cars.
for individual customers. As a result, rather than empty cars simply returning to their original loading locations for a subsequent use by a customer, railway processes evaluate the optimal routing for each empty car that becomes available to deliver it via the lowest cost to the nearest potential point of use, where demand is not already satisfied. This can be accomplished in either highly automated, or in semi-automated fashion. At CP, when an empty car is released by a customer or received in interchange from a connecting railway, its destination is determined by a computer system that uses optimization algorithms to send it to the nearest point where there is unfilled demand for that car type in the CP car order system. CN’s system also automatically directs cars to demand points immediately when they become available. However, the CN system contains a series of control features that are managed by fleet distribution staff. These controls can be set to reflect current unfulfilled demands and direct cars accordingly but they can also be set to direct cars to redistribution points, and then automatically redirect cars from those redistribution points to final demand locations. The primary difference between CN and CP systems is that CP systems use optimization logic while CN systems require managers to determine the optimal routings and distribution patterns.

In both cases the systems can be used to send empty cars to redistribution points for final disposition if it cannot be determined exactly how a car will be used at the time it is received empty.

For all railways, a major preoccupation of car distribution managers is the prediction of future car demand and future car supply. Car supply is provided by fleets that are relatively fixed on a month to month basis as opportunities for railways to increase their fleet supply through short term leasing or the use of foreign railway fleets are in most markets quite limited and may carry unacceptable costs to the railway. When railway operations or demand changes cause congestion in the rail network it can significantly affect current and future car supply. Understanding and anticipating how rail network behaviour will influence future car supply requires fleet distribution managers to carefully monitor the performance of shippers, connecting railways and receivers on their own and connecting networks to predict how future car supply may be affected and to put in place distribution strategies that reflect these considerations.

When railway car fleets become surplus to needs, most railway distribution managers will remove some of the fleet from active use and move it to locations that do not affect the efficient flow of traffic through terminals. If surplus cars are allowed to build up in terminals they decrease the available productive capacity of those terminals by taking up clear track space that can be used for train arrivals and departures and especially for traffic classification. However, the decision on moving fleet out of active use and into storage is difficult as it entails some cost to move the empty cars and will result in additional costs when the cars are again needed by shippers.
**Grain Car Distribution**

As noted earlier, the process for grain car distribution differs from that for carload traffic as much of the empty grain fleet distribution is done by dedicated train services. Also, unlike carload traffic grain traffic is planned for delivery during a particular grain service week, and not on a day to day basis.

Grain car distribution planners have a special responsibility due to the high volume nature of export grain movements to carefully balance the flow of empty cars to demand points to match the expected unloading capability of port grain terminals, and the expected available capacity of the train services en route to those facilities. This “pipeline management” process requires grain planners at the railways to take account not only of the car demands placed by shippers, but of the network demands and constraints that must be managed in the movement of the empty grain cars and the current and expected performance of the affected railway network in the loaded and empty cycle.

On a weekly basis, both CN and CP communicate their planned empty grain service for the following week so that customers can be prepared for empty car loading and the railways can anticipate the subsequent effects on rail pipelines and unloading locations.

### 4.2.5 Locomotives

The number and type of locomotives for each train are determined during the train planning or design phase. When the time arrives to assign locomotives to a specific train a number of different factors are considered including the type of traffic, weight and length of the train, maximum grades over the train’s route and the ratio of locomotive horsepower (HP) to total train tonnage. For example, locomotive units that are used in a local switching assignment will normally be of a lower horsepower, but geared to have a greater tractive effort\(^4\) whereas a mainline locomotive will typically be of a higher horsepower allowing it to achieve higher track speeds.

As one of a railway’s most operationally critical and expensive assets considerable management effort is dedicated to the distribution and allocation of locomotives. Beyond the train plan, locomotive planning also includes how locomotives will be positioned and used from one train to the next to minimize delays\(^5\) and make the most efficient use of the locomotive fleet.

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\(^4\) Tractive effort or tractive force refers to the pulling power of the locomotive. The main factors that determine a locomotive’s tractive effort are the available horsepower of the locomotive, the gear ratios of its drive systems and the physical strain limits that can be imposed on the locomotive components.

\(^5\) The preventive maintenance and servicing of locomotives will be planned to occur when a unit is changing trains in a railway location where those services exist. Locomotives operate with clearly defined preventive maintenance schedules that are in part prescribed by federal regulatory authorities in Canada. Careful tracking of locomotive utilization is therefore required to ensure that all required inspections occur within the appropriate calendar and hours of use time periods. Non-scheduled repairs that are required at other than main terminals are handled by mobile service technicians who will travel to where the unit is located.
While there are many models of locomotives in use in North America, these can generally be categorized into three types.

**Yard Engine:** These are smaller, 4 axle, lower horsepower units (1000 - 1500 HP) that are used for switching cars in rail yards, marshalling trains, and switching cars into customer facilities.

**Road Switcher:** A slightly larger locomotive at approximately 3000 HP, these are typically used in branch line service. Most have four axles and are used in areas where the track structure or curvature of the rail is such that heavier, 6 axle locomotives would be imprudent as derailment or damage to the track structure could occur.

**Mainline:** High horsepower locomotives that are typically the most modern and efficient in a railway fleet. Most have over 4000 HP, six axles, weigh over 200 tons and have the capability of pulling 200 times their weight. Because of their weight and length (over 70 feet) they will rarely be seen anywhere else but in mainline service.

### 4.2.6 Railway train crews

The process of assigning a crew to a train will vary depending on the type of railway (Class I vs. short line), the type of train (local, branch line or mainline) and the labour agreements that dictate the terms of assigning crews to trains.

**Running Trade Roles**

The table below lists the most common running trades’ positions in the Canadian railway industry. As running trades employees for Canadian Class I railways are governed by the provisions of their unions’ collective agreements, progression to positions of greater responsibility comes through a combination of experience and service.

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**Figure 45 Running Trades crew roles**

<table>
<thead>
<tr>
<th><strong>Yard Helper</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The yard helper is the entry level position in the running trades. The position acts in a “helper” role to the yard crew or to a road switching assignment and works under the guidance of the foreman or conductor. Before working their first shift an extensive training course is undertaken that covers both Canadian Railway Operating Rules (CROR) and general railway yard operating practices. The student must pass the CRO Rules test before they can work in an active rail yard on any train assignment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Switchman</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A switchman is the second person in a two person yard crew or the third on a road switcher. They will have gained about one year of experience before working in this capacity, although in areas where crew shortages exist, this could be the entry level position.</td>
</tr>
</tbody>
</table>

---
Yard Foreman

The senior member of a yard crew that directs the activities of all crew members in the execution of work orders, the switching of cars and the assembly of trains in a rail yard. Yard crews are also called upon to switch customer facilities directly connected to a yard. This position is sometimes filled by individuals looking for a regular assignment that will not require them to work away from home.

Yard Master

The Yardmaster’s primary duties are to provide yard crews with their work orders and to coordinate the assembly of trains in accordance with the train plans. While there are fewer Yardmaster positions in yards now than in the past, this is a position requiring the CROR qualifications and experience of a Yard Foreman and conductor.

Conductor

The conductor is responsible for ensuring the work identified in the crew’s work orders is completed. He also provides movement guidance to the Locomotive Engineer and has responsibility for recording work completed and for submission of completed work order documentation at the end of a shift. He also manages any documentation of dangerous commodities traffic that is on a train.

Locomotive Engineer (Yard)

A locomotive engineer is responsible for the operation of the locomotive and the handling of train.

Once an employee has completed their Engine Service Brakeman qualifications they will typically work as an Engineer on a yard switching assignment while they accumulate the seniority required to bid on main line Locomotive Engineer positions.

Job Boards or Pools and Bidding on Jobs

As in most unionized environments railway running trades employees “bid” positions with the most senior qualified employee being awarded the job. However, there are subtle differences with running trades as compared to other unionized environments. While some positions will have regular shifts and hence regular assignments, most train related work is less scheduled with shifts varying with train start times and positioning times unpredictable. Railways will typically create geographically oriented “pools” of employees based on a forecast of crew requirements for a given period of time. The crews who are in that pool then rotate through in a progressive series of “turns”. Railways will typically re-establish pools and assign jobs every 6 months, usually coinciding with changes between daylight savings and standard time. This is known as the “change of card”96.

A large railway terminal will have a certain number of jobs that are permanently assigned (yard and road switchers), a pool for branch line trains, and a pool for mainline trains on a directional basis (for example: an east

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96 In prior eras, railways would publish train schedules or full train timetables and they formed a part of the running trades job bid process. The schedule was referred to as “the card”. The schedules were typically changed every six months. While the schedule has been retained, the process has changed to match the times and the requirements of the modern railway.
pool and a west pool) for both conductors and engineers. The company establishes the number of employees that will be required in each pool. Each employee bids on positions according to his or her preference (highest to lowest usually) and the qualified employees with the most seniority are selected to fill the positions in the pools. The company will also maintain a “spare” pool or spare board where mostly junior employees will list and fill positions on an “as required” basis.

**Calling Crews for Trains**

Railways have crew offices that coordinate matching crews with trains based on the terms of the collective agreements. The list of trains scheduled to depart a terminal in chronological order is referred to as a “train lineup”. Typically the rail traffic control office will finalize the “lineup” departure times, signaling the crew office that a crew must be called. The crew office will match the “lineup” for a particular work pool to the running trades’ employee list, select the crew who is next in line to work and then contact that crew, usually about two to three hours before the scheduled departure of the train.

The process of assigning crews is complicated by several factors including; crews that are away from home and must be prioritized to return to their home terminal, changing departure times in the lineup due to operational reasons, unplanned delays, and the requirements regarding crew rest.

**Crew Rest**

The calling of crews requires that rules governing the mandatory rest of train crews be observed. Canadian rail regulations allow crews to take rest after 10 hours on duty and require them to rest after a maximum of 12 hours. Due to the risk of a crew insisting on being relieved after 10 hours, railways plan all crew assignments to be complete in less than 10 hours. Following a trip a crew must observe the mandatory rest period before returning to work and must not under any circumstance exceed 18 hours on duty in any 24 hour period.

**4.2.7 Railway freight and customer bill of lading process**

The “bill of lading” provided by a shipper gives the railway instructions and information on the shipment of rail freight. The railway acceptance of the bill also acknowledges the railway’s acceptance of their responsibility to move the freight on the customer’s behalf. The amount of documentation required is usually determined by complexity of the route (travelling over multiple railways, crossing an international border, etc.) or the type of commodity (dangerous/ hazardous, dimensional, high value etc.).

The submission of the bill of lading by the shipper to the rail carrier also acts as “release” of the railcar to the railway and signals the car is ready to travel. While some railways will accept the release of a car from a shipper

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97 The spare board is usually fixed at a certain number of employees in the same fashion as other pools. Employees who do not get assigned to any of the pools or assignments, will most often be laid off.

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94 | QGI Consulting
Description of Canada’s Rail Based Freight Logistics System
without a formal bill of lading, they will not have all of the information necessary to properly plan the car’s trip and may have to place the car in “hold” status at a nearby terminal before allowing the car to continue. Canadian Pacific will move rail cars on a car release without a bill of lading; Canadian National’s policy is not to pull a car from a customer siding until the customer has provided all bill of lading information. The bill of lading information forms the basis of a “waybill”, which is the internal railway document that directs railway personnel in the management of the loaded rail car.

Waybills contain information and instructions on the commodity and nature of the goods being shipped - commodity, weight, hazardous properties (if applicable) – as well as the origin, destination and routing of the traffic. This information becomes incorporated in a railway’s electronic traffic and revenue management systems and drives the systems that: create a car’s trip plan, determine what block a car should be in on a particular train, provide the information to communicate the car’s trip requirements to connecting rail carriers where necessary, and drive the railway’s revenue and invoicing processes. If the shipment is an international shipment, the waybill and associated documentation will include information that is required by Customs authorities to allow the shipment to move across international borders.

4.2.8 Railway infrastructure

The movement of trains is often discussed in terms of what exists “above the rail”, but what is below the rail is just as, if not more, important. While there are many aspects to any railway’s infrastructure, the main component is the track and the track structure.

In simple terms, track structure determines loading capacity and the speed at which trains can operate over it. The four primary variables (rail, ties, ballast and grade) determine a track’s capability and capacity. For example, track with 80 lb rail96, softwood ties, and unprocessed natural rock ballast (“pit run”) may be used for light density track with a maximum weight bearing capacity of 180,000 – 220,000 lb per car. Such track generally has maximum track speed of 15-25 mph.

Main line track may have 136 lb rail, concrete ties, crushed rock ballast and a soil cement/ gravel grade that is three feet thick. This track will handle total rail car weights up to 286,000 lbs and speeds of up to 55mph.

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96 Railway track always has the same T shaped profile but can be of varying heights and strength. Rail track is usually classified by weight with the weight referring to how much one yard of track would weight. 136 lb rail is visibly taller and heavier therefore than 80 lb rail and can handle much higher capacities in terms of both weight and speed.
Railways will build, maintain and if necessary upgrade a rail line with a track structure that meets the demands of the traffic that will use it. Consequently, low volume light density branch lines are likely to have lighter rail and older wood ties while high density mainlines will have heavy steel rail, concrete or hardwood ties and the best crush rock ballast available.

Rail lines must also have the capability of handling traffic moving in both directions. Rail track construction is a major capital expense representing 60-70% of a railway’s capital cost, therefore decisions on the addition of capacity to handle trains of varying speeds, and trains moving in opposing directions are taken with great care and after considerable planning by railways. A brief discussion of the basics of track and signaling structures follows in the next section.

**Basics of track, sidings and signal structures**

Sidings are typically added to a railway line in order to allow two trains to pass one another and are the most common method used to expand capacity. Sidings are typically built long enough to permit trains to come to a full stop inside the siding while remaining clear of the switches at either end. This could be expanded to three trains by adding a second siding and ordering two trains to pull into a siding and not to proceed until another “known” train has passed them.

The use of signals allows for a section of track to be divided into smaller sections and for flow to be controlled. By adding the signal, the effective capacity of the same section of track...
is again increased. (See discussion on Rail Traffic Control below)

By adding more sidings and intermediate signals the same section of track capability for trains continues to be doubled. In the example above depending on the direction of the trains, up to seven trains could be handled. Normally the last step in infrastructure management is to take sidings and join them to create double track, effectively allowing two trains to pass without either having to stop.

The complexity of supporting this kind of infrastructure is much greater than what is described here. Depending on the geography being crossed, rail lines will require road grade crossings, culverts, bridges and tunnels.

4.2.9 Railway terminal operations

A railway yard is a complex series of railroad tracks used to manage and sometimes to store rail traffic. Typically, these yards have numerous tracks running in parallel to or tangent to a mainline. Trains with a mix of traffic are received into the yard where local traffic must be sorted for delivery to customers and traffic destined beyond the yard must be grouped by destination for re-assembly into outbound trains. Cars that are going to the same destination that are grouped together for movement in a train are referred to as a “train block.”

In general, a yard’s throughput is limited by the number and length of tracks it has available for traffic classification and the number of physical track connections that have been built between the tracks (crossovers). The tracks in a yard used for the purposes of sorting traffic by destination are known as classification tracks (or ‘class tracks’). In general, a single block will be assembled on a given track however, with the use of crossovers on long tracks a single class track may be used to construct more than one block.

The block into which a car will be sorted depends on the train plans that the car will use to move from origin to destination. A train may arrive in a terminal and require no changes to its structure, or it may simply need to set off one block and pick up another block of cars (a block swap). However, other trains may contain a high proportion of traffic that is destined to customers served by multiple trains departing from that terminal. This type of train will be moved from the yard’s receiving tracks into the classification track area of a yard for processing. There are two primary means by which railways classify traffic and two very different types of rail yard used.

Traffic Classification in a Hump Yard

Hump yards rely on gravity to accomplish much of the work involved in classifying railcars. They are typically used to process large volumes of railcars in a given period, as many as several thousand per day. At the heart of these yards is the hump: a lead track that sits on a hill (hump) over which the railcars are pushed by a dedicated switching locomotive. Single cars, or even coupled cars moving in a block, are uncoupled at the crest of the hump and allowed to roll downhill, using gravity to propel them into their respective classification tracks which group the cars by destination.
The rolling speed of the car is regulated according to the physical status of the railcar (whether it is loaded or empty, heavy or light), the distance it must travel before coming to rest, and even weather conditions (temperature, wind speed and direction). Much of this is accomplished with the use of computer-controlled retarders, which are either pneumatically or hydraulically operated. The retarders grip the sides of the wheels on passing railcars in order to arrest their speed.

While such yards can handle very high volumes of traffic, they are inflexible with regards to their operations as all traffic must pass through the constraint of the hump operation. Hump yards are still used where high volumes of traffic must be classified for movement by trains originating at that terminal. However, North American Class I railways have converted many of their former hump yards to flat yards. CN has in recent years converted its Montreal Taschereau yard to a flat yard and is currently converting the hump facilities at their Edmonton

Figure 49 Representative Hump Yard Schematic

On an average day Canada’s freight railways will process almost 8000 rail cars through their hump yards.
Walker yard. CN retains hump yards in operation in Winnipeg (Symington) and Toronto (MacMillan). CP still operates hump yards in Calgary (Alyth), Agincourt and Winnipeg (Rugby).

Traffic Classification in Flat Yards

A flat yard will have classification tracks with a similar structure to a hump yard, and the tracks may be constructed in a “bowl” with slight elevation at each end for safety and operating convenience. However, in a flat yard all traffic classification must be done using locomotive power to switch cars between tracks. Like a hump yard, a flat yard’s classification throughput will be limited by the number of clear tracks available for sorting traffic. The structure of the yard and the ability to keep through train movements separate from classification activity will have a major impact on the productivity of the yard. In addition, in a flat yard, the skill and planning of the switching crews is of great importance in determining productivity. Making decisions on how many cars to move at a time, where cuts should be made, and in what order so as to sort the traffic with the fewest number of movements in the shortest time; requires considerable experience and skill. Unlike hump yards, most flat yards can handle rail traffic entering and leaving the classification tracks in either direction providing efficiency and flexibility in the use of the tracks.

Limits on Rail Yard Service and Productivity

Rail cars require locomotive power to move and they cannot be moved except between rails. These two obvious and simple statements also explain the key limitations on a railway in the management of traffic to meet customer needs. When cars are assembled in blocks and then into trains they can move efficiently according to the plan that placed them in these blocks. At the point that a train is assembled, the future of a car is determined and for better or worse its fate is allied to that of the train into which it is assembled. When an individual car falls behind schedule due to failures in operations, outside forces such as weather, or unplanned rail traffic congestion, there are few meaningful opportunities for railways to recover the performance of that car. There are not many locations in a rail car’s journey that allow for any ad hoc decision making by railway staff. The process flow of flat yards and particularly of hump yards requires that cars be handled according to the limitations of the train design plans and the physical limitations of the infrastructure. In particular, removing a car from a train or even a block that has been delayed so that it can receive “priority” handling would be extremely disruptive to the normal operations of the railway and can be done only very infrequently.

As noted earlier, rail productivity in a terminal is a function of the design and overall capacity of the infrastructure but also of the skill and dedication of railway employees. Rail traffic that is processed quickly and efficiently through a terminal will reduce the average dwell time of the cars in the terminal (in general, maximum terminal throughput is inversely proportional to dwell time). By focusing on reducing dwell time railways also increase the
flexibility and effective throughput capacity of a rail terminal by maintaining as much free track and switching infrastructure as possible. This increases their capacity to deal with unexpected problems and allows for faster recovery in such situations.

4.2.10 Rail Traffic Control

A railway's Rail Traffic Control processes (RTC) govern the movement of trains on all railway tracks outside of rail yards, including movements of track maintenance and inspection vehicles. The rail traffic controllers are responsible for setting the final operating schedule for train departures and they are the final authority to allow trains access to any specific track, starting with the departure from a terminal yard.

Using “permission systems”, the RTC primarily uses two distinct sets of processes – one manual and one automated - that ensure only one train occupies a specific portion of a track at one time.

**Occupancy Control System (OCS)**

OCS is a manual process\(^{90}\) where train crews must request and be granted permission to enter a specific section of track, at and during specific periods of time. OCS is typically used on light density branch or secondary lines where the numbers of trains do not warrant the capital investment in an automated system. OCS is also used as the backup system during periods where an automated system is under repair or out of service on a particular section of track.

Under this type of control process, train crews are given instructions that determine when they can access a certain section of track and where they may have to stop in a siding along the route of that section of track to allow another train to pass them. These instructions are normally relayed to train crews in a radio communication, but can be provided by fax or email at waypoints (station offices or crew bunkhouses) along the route of the train. The process of relaying and maintaining these orders is called the issuance of a “Track Occupancy Permit” (TOP). It is issued and managed by the Rail Traffic Controller (dispatcher) assigned to that section of track (individual dispatchers will have responsibility for specific sections of track, for instance one or more subdivisions). The dispatcher is also responsible for granting permission to track maintenance crews to access the same track through the issuance of TOP’s.

**Centralized Traffic Control (CTC)**

CTC is the automated approach to granting permission to access specific sections of track. This is done through signaling systems installed on masts at trackside. CTC operations are typically found on high volume main line

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\(^{90}\) The rail industry refers to this type of process alternatively as “Track Warrant Control”, “Dark Territory”, or “Train Order Systems”. In Canada the “Canadian Rail Operating Rules” (CROR) now refers to it as Occupancy Control System.
tracks with either double track or multiple passing tracks within a specified territory. It allows for increased traffic flow and therefore increased capacity of the rail line through the territory CTC is covering.

Trains may only enter onto a CTC controlled section of track with the indication of a permissive signal or through the instruction of the dispatcher responsible for that territory. Linked to automated track switches controlled by the RTC dispatcher, signals located on CTC territories are triggered both manually and automatically depending on the purpose and location of the signal\(^\text{100}\) and will direct trains from one track to another and into sidings and passing tracks.

In most cases, in addition to controlling the CTC signals and switches, dispatchers will also maintain radio communication with the train crew, providing instructions on meets (the passing of two trains on a single track with a siding) or general conditions of the route ahead. Rail traffic controllers may be centralized or decentralized controlling specified territories on the railway.

### 4.2.11 Railway Interchange Processes

An estimated 25 -30% of Canadian rail traffic is interchanged between carriers. The processes of interchange involve both the physical exchange of rail cars and the transfer of bill of lading and operating information between the railways. Prior to the development of electronic systems for the exchange of information, physical copies of all waybills, customs documentation and dangerous goods handling information would have to be exchanged between railways to enable the receiving road to determine how to move and arrange for financial settlement with the connecting carrier and/or the shipper of interline rail traffic. Today, all such transactions are accomplished electronically. The following section very briefly describes the key aspects of railway interchange processes. The physical process of interchange is the same for exchanges of traffic between Class I railways as it is for interchange between Class I’s and short line railways. However, while Class I railways may have significant leverage in negotiations over the issues involved with planning and executing interchanges with each other, short

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\(^{100}\) Signals that are linked to track switches and potentially control the movement of trains between two tracks are manually controlled by a dispatcher. The dispatcher controls the signal that will be displayed (such as red meaning to come to a complete stop). Automatic signals will typically be found at locations where a movement between tracks is not possible, but warnings (sometimes triggered by sensors in the track) will order a train to stop then proceed with caution.
line railways do not generally have the commercial strength to match their Class I partners and therefore are at a disadvantage in dealing with any disputes arising from interchange planning and operations.

**Interchange Agreements**

The most common form of interchange has normally been accomplished through the use of designated interchange tracks to which the connecting railways each had physical access and where the railways would agree to drop-off and pick-up traffic that was to be interchanged. In order to avoid operating conflicts and ensure safe operation on these tracks railways would sign interchange agreements which specified how such interchanges were to take place and what operating protocols would be in place for the use and maintenance of such facilities. In addition to agreement on the physical operations, agreement with respect to how the financial aspects of interchange were to be handled was also required. In addition to the use of interchange tracks, railways can agree to allow a delivering road to run over their tracks to deliver traffic to a location in one of their own rail yards, or even directly to a customer. These “run-through” interchange arrangements require the carriers to agree on protocols for qualifying crews on operations on the host railway and for controlling the dispatching of such trains. Other types of arrangements that involve exchanging crews on interchange trains but keeping the delivering road’s locomotives on the train are used by railways to improve interchange efficiency and asset utilization and service.

Today, the processes of both operating and financial issues have been streamlined through the use of industry standard processes and agreements for the interchange of traffic. Many of the key transactions required for the interchange of rail traffic are now facilitated through the use of electronic data interchange (EDI). Standardized EDI transactions are used by companies where high volumes of repetitive transactions need to take place. In the rail industry, the primary EDI transactions that facilitate traffic interchange are:

- **417 – Rail Carrier Waybill Interchange**
  - Allows a rail carrier to provide detailed bill of lading to the connecting carrier on a car by car basis and this information can be forwarded prior to the interchange.

- **418 – Rail Advance Interchange Consist**
  - An advance list of rail cars that will be delivered in interchange. The 418 allows advance planning of the interchange by detailing car type and commodity characteristics as well as the length, weight and arrangement in the train of all cars and the total length and weight of the train to be delivered. The estimated time of arrival in interchange of the traffic can also be included.

- **419 - Advance Car Disposition**
  - This transaction can be sent to a connecting carrier well in advance of interchange to allow the carrier to determine how the car should be “blocked” for delivery in interchange. For a 419 transaction to be useful, it must be used in the context of explicit agreements between the carriers that govern the blocking activities that one carrier will perform for the other carrier.

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101 EDI standards in North America are developed and managed by the American National Standards Institute (ANSI) and then further specialized within industry by the relevant industry associations.

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QGI Consulting

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the absence of an agreement to block cars to facilitate handling on the receiving road, a delivering carrier may deliver cars in any order that suits their own operations, thereby transferring the work of classifying the traffic to the connecting carrier.

- **420 - Car Handling Information**
  - The counterpart of a 419, this message from a receiving carrier provides the delivering carrier with blocking instructions for a car to be delivered. The 419/420 process can only be effective if the 419 is sent to the receiving carrier at a point in a car’s transit where classification is possible at a yard intermediate to the interchange location.

However, in spite of the use of standardized processes for information exchange, interchanges remain a key location of potential congestion and conflict in railway operations. They are the point at which traffic moves physically between organizations but also where the financial liability is transferred. Each railway’s staff will wish to optimize the operations of their own railway and may not be responsive to the effect of their decision making on overall supply chain performance. The key aspects of interchange which have the ability to create conflict between carriers are discussed below.

**Capacity of interchange facilities**

The physical capacity of interchange tracks may not be capable of handling all of the traffic that must be exchanged by a single train assignment. In cases such as this, traffic may need to be held back from interchange and depending on the configuration of railway infrastructure may create congestion for the delivering carrier.

**Timing of interchange**

Especially in cases where interchanges are congested, the timing of each road’s activities at the interchange may need to be coordinated to conform to constraints such as locomotive utilization needs, crew hours of service limitations and the need for traffic moving in interchange to connect to scheduled train or switcher assignments.

**Agreements on blocking**

Where agreements on blocking exist it is important that railways deliver traffic in interchange that is arranged in the order – blocked – that has been agreed to. Failure to do so can seriously disrupt the operations of the connecting carrier who may have scheduled connections and switching activity based on the assumption of receiving properly blocked trains. When trains must be moved to classification tracks to establish blocks that should have been provided by the delivering road, delays to the traffic will occur.

**Car Hire liability**

Car hire is the payment made by the railway using a railcar to the owner of the car. Most car hire charges are based on a combination of hourly and mileage rates that are specific to the specific car type and may be subject to negotiation between the roads for each car group owned by the roads. When traffic is moved in interchange, the car hire liability is transferred between roads and charges begin to accumulate for the use of the cars on the
hosting railway. Railways who wish to minimize their car hire liability may wish to push for the interchange of traffic as quickly as possible to connecting carriers in order to transfer such financial liabilities which may amount to a charge of $100 - $300 per hour for a trainload of railway owned cars.

4.3 Services to Customers

The above sections of the report focus on railway operations principally from the perspective of the railway. The following sections highlight the railway/customer interface processes involved with services provided to customers at origin, enroute and at destination. Included in each of the following sections are examples of the types of problems that can result for railways and shippers and the impacts of such problems.

4.31 Services to Customers at Origin

Railway services to carload and unit train customers at the shipping origin consist principally of the pickup of loaded cars released for shipment by the customer and the placement of empty cars. Railways may at times, when requested by the customer, perform supplementary in-plant switching and customers are generally charged separately for such services.

As was discussed earlier, the railway, prior to physically serving a shipper’s facility, will have received instructions from the shipper that there is work to be done. These instructions are communicated in the form of loaded or empty car releases, bill of lading instructions or the ordering in of empty cars for loading.

Industrial versus Wayfreight Switching

Shippers located within the operating limits of a railway terminal will be served by an industrial switching assignment. Industrial switching assignments are scheduled trains that operate from a railway terminal and serve customers typically within the industrial sector of a city. These assignments typically serve a number of customers located within a defined switching zone and will usually drop off empty cars and pick up loaded cars in a single visit to a customer’s site.

Shippers located outside of an industrial switching zone such as most grain elevators and forest products companies will receive their switching services from a wayfreight train. A wayfreight is a local freight train that operates between railway terminals and provides switching services to customers located along its route.\textsuperscript{102}

Instructions for crews whether in an industrial zone or on line, are created for each switching assignment or wayfreight train to be operated based on the instructions received from shippers. For some shippers, commonly

\textsuperscript{102} A wayfreight train may also begin and end its trip at the same railway terminal.
referred to as “open-gate” or “spot on arrival” customers, the railway has standing instructions to deliver whatever cars are available at the first serving opportunity. As a train crew completes its switching work at each customer facility it records the work completed including the specific cars placed and picked up and the time the work was completed. When the crew returns to its home terminal, or in the case of a wayfreight arrives at its destination terminal, the completed work orders (switch lists) are submitted for data entry into the railway’s computer systems. The process for reporting work completed will vary by railway and may vary by location for a given railway. In some cases the data entry may be done by local train reporting personnel while in others the crew may be required to fax their switch list where data entry is done. The information reported through this process populates the railway’s operating systems providing up to date car location information that is subsequently used for operational planning.

Railways generally operate industrial switching assignments and wayfreight trains against defined schedules on specific days at specific times. Neither CN nor CP generally commits to the pickup and delivery of traffic at a specific time each day. Railways generally only commit to providing service during a particular 8 hour window during the day and require that their customers be able to adapt to receiving service any time during that window.

Unit Train versus Carload Shippers

Unit train service is used principally by shippers of bulk resource commodities such as grain, coal, dry sulphur and potash. Their facilities are typically located in remote areas often on branch lines. Unit trains move loaded from origin to destination and back to origin empty as complete train sets\(^{103}\). An empty train of as many as 112 rail cars will be delivered to the loading site, whether a grain elevator or mine site, and placed either on the loading track or a holding track. In some instances the locomotives will remain with the train during loading. Control of rail cars and/or locomotives may be handled by the shipper’s personnel while the train is on the customer’s property, or the railway may provide a crew to manage the train and move it as necessary during the loading process. In some cases the shipper may provide their own locomotive power to handle these activities.

Customer In-Plant Switching

Generally speaking when a switching assignment arrives at a customer location to pick up or drop off rail cars it will access the customer’s site and place or lift cars at designated tracks. These designated tracks can be those where the shipper loads the cars or simply holding tracks within the customer’s plant site. A switch crew will in most instances be required to pull loaded cars from the loading track and then place the empty cars on the same track. This would be the case particularly for smaller shippers with limited in-plant rail infrastructure and no in-plant switching capability.

\(^{103}\) Individual cars may be removed from an empty train and replaced by others in transit to the loading location if cars require mechanical repairs prior to being loaded again.
Some railway shippers provide their own in-plant switching services either for safety reasons or to enable them to more effectively coordinate on site activities without being subject to potential variability in the arrival and departure times of railway crews. In these cases the switching crew will usually place cars on a holding track away from where cars are loaded. The customer then assumes responsibility for moving the empty cars from the holding track to the loading track and moving the loaded cars back to the holding track for pick up by the switch crew.

*Where Problems Can Occur*

**Problem: Late Assignment or Train Start**

A shipper’s planned switching service can be negatively impacted as a result of the late departure of an industrial switching assignment or wayfreight train. Because railway crews are by regulation limited in the number of hours they can work, a delay at origin can result in a crew’s allowable service hours being exceeded prior to the completion of all of their planned work.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in terminal processing of cars</td>
<td>• Delayed arrival of cars at serving yard</td>
</tr>
<tr>
<td></td>
<td>• Terminal disruption whether operational or weather related</td>
</tr>
<tr>
<td></td>
<td>• Asset constraints whether personnel or locomotives</td>
</tr>
<tr>
<td>Train Crews</td>
<td>• Late assignment of crew due to either process failure or</td>
</tr>
<tr>
<td></td>
<td>availability of crews</td>
</tr>
</tbody>
</table>

**Problem: Delays to Switching Assignment En Route**

Service to customers can also be impacted if a switching assignment or wayfreight train is delayed during the course of its shift or trip. The impact of such delays on the railway’s ability to provide service will be the same as if the train or assignment started late – the train crew may run out of allowable service hours.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay in performance of work at one</td>
<td>• Delayed access to customer facility caused by arrival outside planned switch</td>
</tr>
<tr>
<td>or more customer locations</td>
<td>window or conflict with customer plant site operations</td>
</tr>
<tr>
<td></td>
<td>• Crews required to perform more work than planned in order to switch cars in and</td>
</tr>
<tr>
<td></td>
<td>out of facility</td>
</tr>
<tr>
<td></td>
<td>o Shipper has not placed cars for pickup on designated tracks or</td>
</tr>
<tr>
<td></td>
<td>designated tracks for set off occupied by other traffic</td>
</tr>
<tr>
<td></td>
<td>o Shipper request of switch crew to perform additional work on site</td>
</tr>
<tr>
<td></td>
<td>o Shipper failure to properly maintain tracks at their facility allowing for</td>
</tr>
<tr>
<td></td>
<td>buildup of snow or other obstructions that impede access</td>
</tr>
<tr>
<td>Network or Terminal Disruption</td>
<td>• Reduced productivity due to operational or weather disruptions</td>
</tr>
</tbody>
</table>
Delays incurred during the course of the switching assignment are in some instances beyond the railway’s control. Switch crews arrive at a customer location with a specific planned workload based on their switch list and the expectation that cars to be lifted will be ready and that the designated tracks within the customer’s facility will be available. In instances where shippers have failed to ensure the readiness of their operations for the arrival of the railway or request the train crew to perform more work than planned the shipper can be the direct cause of the delay. In such instances the impact will be felt not by the shipper causing the delay but rather by those shippers scheduled to be served later.

**Problem: Assignment or Train Cancellation**

Service to customers will also be impacted when the railway opts to cancel a wayfreight service or industrial switching assignment. While this is a conscious decision of the railway the reasons for cancellation may in some instance be beyond the railway’s control.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Train or Assignment Cancellation</td>
<td>• Asset constraints whether crews or locomotives</td>
</tr>
<tr>
<td></td>
<td>• Terminal or network disruption whether operational or weather related</td>
</tr>
<tr>
<td></td>
<td>• Labour productivity or supply issues</td>
</tr>
<tr>
<td></td>
<td>• Railway operational decision to combine assignments or train runs which may stem from:</td>
</tr>
<tr>
<td></td>
<td>o Late arrival of inbound traffic delaying terminal processing of traffic for scheduled assignment</td>
</tr>
<tr>
<td></td>
<td>o Low traffic volumes on a given day</td>
</tr>
</tbody>
</table>

**Impacts on Customers**

When there are disruptions to the planned or expected switching service customers can be impacted in various ways. The magnitude of the impact and the implications on downstream logistics operations will depend on the specific customer, the available buffer within the customer’s supply chain operations, and infrastructure limitations for product storage at origin. Frequent disruptions that affect the reliability of the service could also impact on the shippers’ ability to market his or her product.

**Conflicts with customer operations**

The late arrival of a switch engine can negatively impact a shipper’s on site operations associated with the safe movement of people and vehicles on their property and even the customer’s manufacturing or processing activities. This can result in lost productivity for the customer’s operations or potential safety issues for both customer and railway personnel.
Delays in Shipment and Downstream Impacts

For some customers whether a switching service is late or does not arrive at all may yield the same outcome – the inability to load cars on the day planned resulting in lost labour productivity and delays in shipment. For some customers the impact may be nominal and amount to a minor loss in productivity and frustration but has no lasting impact as they are capable of recovering relatively quickly. For others, particularly large customers who have dedicated labour assigned to rail car loading, the impact may be more severe.

Depending on the structure of a shipper’s supply chain, operations’ failure at origin can also cause problems at destination and potentially result in the payment of contract penalties. For instance grain shippers may plan to load unit trains of specific commodities on specific days to meet scheduled port terminal and ship loading requirements. If the railway fails to service the grain company on the day planned these downstream operations may be adversely impacted.

Terminal Congestion

The efficient operation of a railway terminal depends on achieving a consistent level of throughput including the processing of trains passing through the terminal, the switching and classification of arriving and originating traffic for outbound train assembly, and the movement of cars from the yard to customer facilities. Failure in terminal processes that impact switching performance to customers can also result in broader impacts on the railway. The inability to efficiently switch out cars from the rail yard to customers can quickly result in an accumulation of traffic within the terminal leading to congestion and further impacts on customers.

Intermodal Services at Origin

CN and CP segregate their intermodal business into two distinct categories – domestic intermodal where shipments originate and terminate within Canada and import – export traffic that moves between the railways’ inland intermodal terminals and container terminals located at the major ports. At a high level domestic intermodal can be further segregated into retail and wholesale business lines. Generally speaking retail intermodal services are characterized by the railway providing local pickup, delivery, or full door-to-door service in addition to the rail movement. For wholesale intermodal shipments the railway service offering is limited to terminal to terminal rail movement with pickup and delivery services at either end managed by the shipper and or receiver typically utilizing contract trucking services.

CN and CP offer shippers a variety of service plan options based on these two basic service models. These service plans provide shippers with flexibility with respect to the railway services used including the selection of the equipment – whether it is railway supplied or shipper / 3rd party supplied. The service plan selected by the
customer determines the rates charged by the railway. As the tables below illustrate the railway service offerings in this respect are similar yet not identical.

Figure 51  CP Intermodal Service Plans

<table>
<thead>
<tr>
<th>Plan #</th>
<th>Equipment Owner</th>
<th>Service Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Railroad</td>
<td>Door to Door</td>
</tr>
<tr>
<td>225</td>
<td>&quot;</td>
<td>Door to Ramp</td>
</tr>
<tr>
<td>250</td>
<td>&quot;</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>275</td>
<td>&quot;</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>300</td>
<td>Customer</td>
<td>Door to Door</td>
</tr>
<tr>
<td>325</td>
<td>&quot;</td>
<td>Door to Ramp</td>
</tr>
<tr>
<td>350</td>
<td>&quot;</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>375</td>
<td>&quot;</td>
<td>Ramp to Door</td>
</tr>
</tbody>
</table>

Figure 52  CN Intermodal Service Plans

<table>
<thead>
<tr>
<th>Plan #</th>
<th>Equipment Owner</th>
<th>Service Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Motor Carrier</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>20</td>
<td>Railroad</td>
<td>Door to Door</td>
</tr>
<tr>
<td>25</td>
<td>&quot;</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>40</td>
<td>Steamship(^{104})</td>
<td>Door to Door in North American Service</td>
</tr>
<tr>
<td>45</td>
<td>&quot;</td>
<td>Ramp to Ramp in North American Service</td>
</tr>
<tr>
<td>60</td>
<td>Customer</td>
<td>Door to Door</td>
</tr>
<tr>
<td>65</td>
<td>&quot;</td>
<td>Ramp to Ramp</td>
</tr>
<tr>
<td>82</td>
<td>Steamship</td>
<td>Door to Door in Export Service</td>
</tr>
<tr>
<td>85</td>
<td>&quot;</td>
<td>Ramp to Ramp in Import / Export Service</td>
</tr>
<tr>
<td>87</td>
<td>&quot;</td>
<td>Port to Door in Import Service</td>
</tr>
</tbody>
</table>

While there are some differences in the operational and transactional processes for container movements depending on the type of intermodal shipment and the railway service plan selected by the shipper the basic business processes employed are much the same and include: order and supply of equipment, shipment booking, pickup of loaded containers and delivery to railway intermodal terminals and loading of containers on to intermodal rail cars for movement to destination.

\(^{104}\) The railways do in some instances, by agreement with the steamship lines, use international ocean containers in domestic intermodal service. These types of movement are governed by regulations contained in memorandums published and administered by the Canada Border Services Agency (CBSA) and pertain to Customs Tariff item 9801.10.00.
Equipment Order and Supply

For domestic intermodal movements shippers will either supply their own container, contract with 3rd party trucking or logistics companies, or obtain a container from the railway. Unlike the carload business where shippers can place orders for rail cars through the railways’ ECommerce sites ordering containers remains somewhat more rudimentary. When ordering containers from CN and CP shippers will place their equipment orders via email or fax through CN and CP’s centralized intermodal operations groups. Equipment orders are required to be placed by a specified cut-off time the day prior to when the equipment is required. The railways then confirm the acceptance of equipment orders to the shipper providing order reference numbers.

How the equipment is physically supplied to the shipper’s location is determined by the “service plan” selected. As noted earlier this can range from full door to door service provided by the railway to all highway services being controlled by the shipper. If the shipper opts to provide his own trucking services he is required to pick up the empty container at the railway intermodal terminal within a specified time period. Gaining access to the terminal requires the driver to present the order reference numbers provided by the railway at the terminal gate.

For export movements shippers order their containers directly from the steamship line with which they are booking ocean passage. Shippers, or their agents, will first make an ocean booking with a shipping line for shipment of a container. The ocean carrier will confirm acceptance of this order by issuing a booking confirmation to the shipper confirming the details of the shipment including the pickup location for the empty container and drop off location for the loaded container.

As with domestic intermodal shipments the physical supply of the ocean container to the shipper’s facility and its return to the intermodal terminal for rail movement to the port can be done using railway or shipper supplied trucking services. Depending on the location of the shipper the empty container may be sourced from the railway’s intermodal terminal or from a 3rd party container storage and distribution facility operated on behalf of the steamship line. Access to empty containers is controlled by the booking confirmation numbers provided by the steamship company to the shipper.

Intermodal Terminal Process

When a container has been loaded and is ready for shipment it must be returned to the intermodal terminal for rail movement to destination whether destined to a domestic terminal or a port for export. CN and CP processes for the return of loaded containers are different with CN requiring shippers to reserve train slot capacity prior to delivering the loaded container to the intermodal terminal.

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105 CN’s Intermodal Retail Operations Centre and CP’s Central Operations Group (COG)
CN Reservation System

CN’s train slot reservation system is designed to smooth terminal processes and to manage terminal congestion by establishing defined windows when loaded containers can be delivered to the intermodal terminal. Before a shipper can deliver a loaded container to a CN terminal it must have a reservation number from CN that confirms CN has reserved slot capacity for the container on a specific train on a specific date. The reservation process also defines the delivery window for the container to the terminal establishing the earliest and latest dates that CN will accept the container. A separate reservation number is required for each container. Reservations are made through CN’s Ecommerce system.

CP does not employ a reservation system like CN and shippers are therefore free to return loaded containers to the origin intermodal terminal at their convenience once it is loaded and the appropriate billing documents have been transmitted to the railway. For export container movements the shipper will transmit billing documentation to the steamship line which in turn will transmit a subset of this information to the railway. The railway will only accept a loaded container through the gate once it has received confirmation from the steamship line.

In-Gate Procedures

The delivery and acceptance of a loaded container at a railway intermodal terminal is referred to as the in-gate process. As noted earlier CN’s requirements for delivery of containers are more stringent than CP’s employing a reservation system that defines the specific window available to a shipper during which this delivery can be made.

To improve the efficiency of gate operations at its terminals in Montreal, Edmonton, Winnipeg and Vancouver CN has developed an automated in-gate process called Speed Gate. This system allows pre-registered drivers quick access to the terminals through self-serve gate stands. The system uses biometric technology (fingerprint identification) to validate driver identities and grant them access to the terminals.

Once a container has been in-gated it will be offloaded from the chassis and placed on the ground to await loading to its intermodal train.

Where problems can occur

Problem: Shipper Unable to Obtain Reservation on CN

Obtaining intermodal slot reservations can at times be problematic for shippers, particularly small shippers. This is because of how CN makes train capacity available to its customers on a daily basis. CN determines weekly how much intermodal train capacity it will make available to shippers by origin-destination pair by day of week. First call on capacity is allocated to wholesale intermodal customers who are provided, based on historical shipment

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106 CN will on a case by case basis permit shippers to deliver loaded containers to an intermodal terminal in advance of the reservation window and charges the shipper storage fees.
volumes a daily “reserve allocation”. Wholesale customers have defined windows of opportunity to reserve this capacity daily and if they do not it is then made available to all other wholesale and retail shippers.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient Capacity Available</td>
<td>• Corridor capacity already allocated to other customers</td>
</tr>
<tr>
<td></td>
<td>• Network disruption reducing available capacity</td>
</tr>
<tr>
<td></td>
<td>• Insufficient traffic available for CN to add capacity</td>
</tr>
</tbody>
</table>

**Problem: Extended Dwell at CP Intermodal Terminal**

CP does not use a reservation system to match train capacity to traffic volumes. As such any intermodal shipper that has loaded a container and provided the required billing documentation can deliver the container to a CP intermodal terminal. The result can sometimes be that a container will remain in the terminal for several days or longer awaiting available train capacity.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No reservation system in place</td>
<td>• Inability to match capacity to demand or smooth demand to available capacity</td>
</tr>
<tr>
<td></td>
<td>• Railway marketing strategy seeks to adapt to market</td>
</tr>
</tbody>
</table>

**Problem: Unable to Obtain International Container for Export Shipment**

Shippers located at inland points away from container ports will sometimes be unable to obtain adequate supply of international marine containers for source loading of export shipments.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient imports destined to region to create necessary supply</td>
<td>• Unwillingness of shipper to pay inland repositioning costs</td>
</tr>
<tr>
<td></td>
<td>• Shipping line strategy to expedite empties to port of exit rather than reposition for marginally profitable export movements.</td>
</tr>
</tbody>
</table>

**Impacts on Customers**

When intermodal customers are unable to secure adequate capacity whether containers or train capacity it will result in delays to their shipments and may result in higher transportation costs. For domestic intermodal shippers the inability to access CN and CP intermodal services leaves them with little alternative other than to move their commodities by truck which will more than likely result in higher transportation costs.

For exporters their option will be to ship their products to port based trans-load operators using either railcar or domestic intermodal services. This will add time and unanticipated cost to the movement of the shipment.
potentially resulting in missing confirmed sailing dates. For all shippers these delays may jeopardize customer commitments and lead to the loss of sales.

4.32 Services to Customers in Transit

From the time a rail car is switched by the railway from the customer’s rail siding, or in the case of intermodal once the container is delivered to the terminal, the railway assumes full control of the shipment. The railway will in its sole discretion determine how the rail shipment is moved from origin to destination and in what time frame. In moving the car to destination the railway will seek to maximize the efficiency of its own assets while providing a level of service consistent with the customer’s expectations or contractual commitments.

Railway – Customer Interface Processes

As a general rule there is limited interface between shippers and railways with respect to rail shipments while they are in transit to destination. Railway communication to customers consists principally of information regarding shipment status, expected time of arrival (ETA) at destination, customer communiqués related to service disruptions impacting shipments and for some traffic such as unit trains forward destination planning information. Shippers will communicate with their rail carriers to inquire about the status of their shipments and to request services en route.

ETA information

Railways communicate with their customers with respect to day to day operating activities in a number of ways. The primary vehicle for such communication is through the railways’ Ecommerce sites and via email. For shipments in transit a key area of communication is the provision of shipment status information including the last reported position of the traffic they have shipped or that is destined to their facility and the estimated time of arrival of the shipment at destination. Shippers can access status and ETA information by making specific inquiries through the railways’ Ecommerce sites on a car by car basis or in some cases can create automated reports that provide updated status and ETA information based on railway reporting en route. Shippers may also choose to obtain this information through the services of third party firms specializing in the provision of such electronic services.

Network Disruptions

Railways will communicate to their customers when there are disruptions impacting the operation of the railway network. For most customers railway communication regarding network disruptions will be in the form of broadcast email messages issued by the railways identifying the nature of the disruption, the components of its network that are affected, and the railway’s expectations for return to normal operations. CN provides its customers with “State of the Railroad” communiqués that are both posted on their website and available directly to customers through an email subscription service.
Planning

For some large bulk unit train shipments the railway will communicate with its customers to coordinate train operations with destination terminal activities. For these large customers this communication usually takes the form of daily conference calls involving railway, shipper, and terminal operations personnel. In many instances the calls are designed to address both loaded and empty train movements currently moving on the railway. Key information discussed can include:

- Status update of all shipper trains for both empty and loaded movements including last reported location and fleet management issues such as car substitutions due to mechanical problems
- Train service planning and estimated arrival times for loaded trains at destination terminals as well as for empty train management and scheduling for arrival at loading sites
- Status of shipper loading operations and terminal unloading operations focusing on known or anticipated disruptions to normal operations

Shipper Initiated

Shippers will communicate with their rail service providers to inquire about the status of their shipments or to make a service request for a change to the planned handling of the shipments. The principal point of contact within the railways’ organizations is generally their centralized customer service operations and contact can be made by telephone, email or fax.

Shippers will at times request changes to the planned service for a rail shipment. Examples of such requests include rail car diversion\(^1\)\(^0\), storage en route, weighing of traffic in transit and to request expedited handling of a shipment. For requests such as diversions or weighing in transit the railways may require the requests to be submitted in writing via email or fax.

Where problems can occur

Problem: Delays in Transit

The most common problem experienced by shippers once a car is in transit is that the shipment is delayed en route. Delays generally occur in railway terminals as opposed to on-line and can be due to circumstances beyond the railway’s control or as a result of conscious operating decisions made by railway personnel.

\(^{10}\) A diversion is a shipper request to the railway to change the movement instructions for a rail shipment. This may involve a change to the consignee, routing of the traffic, or the destination. Such requests are accepted by the railway but are subject to optional service charges and may depending on the specific change require the shipper to provide new billing information to the railway.
<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network or service disruptions</td>
<td>• Weather related disruptions</td>
</tr>
<tr>
<td></td>
<td>• Asset failures (crews or locomotives)</td>
</tr>
<tr>
<td>Railway Operations Decisions</td>
<td>• Cancellation of trains due to insufficient traffic resulting in traffic from two trains being combined into one</td>
</tr>
</tbody>
</table>

**Impacts on Customers**

The type and magnitude impacts on shippers as a result of delays to shipments in transit can vary significantly.

**Exporters**

For shippers of export commodities, whether containerized goods or bulk products, delays enroute can result in their downstream logistics operations being negatively impacted. These problems will be similar to those that can flow from a service failure at origin as described earlier.

**Private Equipment Shippers**

Shippers who use private rail car equipment can incur an additional cost impact when traffic is delayed in transit. Meeting their expected or budgeted logistics costs is dependent on achieving an expected level of asset utilization on their rail equipment. Much like the railways these shippers lower their costs and improve their return on investment with improved utilization of the rail car. When cars are delayed in transit it reduces utilization and increases costs.

**4.33 Services to Customers at Destination**

Carload traffic moving on manifest trains will generally arrive at a railway’s destination terminal and the cars will be processed through its classification yard. Traffic classification activities and processes at destination are essentially the same as at origin with rail cars switched out from arriving train consists and organized into groups to match planned switching assignments and yard transfers. From the classification yard cars will move to either the consignee’s rail siding, to interchange with a connecting carrier, or to a smaller serving yard within the larger rail terminal where cars will be further sorted and assembled to the appropriate industrial switching assignment.

As at origin, domestic intermodal trains will terminate at the railway’s intermodal terminal. Containers will be offloaded from the rail cars and placed either on the ground or on a chassis within the terminal awaiting final delivery to the receiver or pick up from the terminal by the receiver or his designated agent.

**Railway – Customer Interface**

The primary interface between railways and their customers at destination involves communication regarding the availability of traffic and planning for final placement of the cars. The railway will notify receivers, either upon
arrival or immediately prior to arrival, that cars are available for delivery. Customer notifications issued by the
railways are typically done using email and may be computer generated based on railway reporting of the car’s
location. In smaller terminals notification processes may be less formal and be done by clerical personnel over the
telephone.

Receivers will be identified by the railway as either “order-in” or “spot on arrival” customers. Order-in
customers are required to place an order with the railway to have cars delivered. An order must identify the cars
individually by initial and number. Receivers will communicate to the railway on which day they want the cars
delivered. If cars are requested to be held by the railway beyond the next planned service day the railway will
normally place the cars in constructive placement status and demurrage charges will apply. Spot on arrival or
open gate customers are not required by the railway to order in cars. The railway has standing instructions to
deliver all available cars to the receiver unless it receives instructions to the contrary.

For intermodal shipments how the final delivery of the container to the customer is done is determined by which
intermodal service plan the shipper has selected. If the service plan includes railway delivery at destination the
railway will contact the consignee and schedule a delivery appointment. If the container is to be picked up by the
consignee or their third party service provider the railway will notify the customer that the traffic is available for
pick up. The customer will then make arrangements to have the container retrieved from the railway intermodal
terminal.

Port and Terminal Operations

Bulk commodities moving in unit train service and export container traffic are delivered to receiving terminals in
trainload lots. Unlike manifest traffic and domestic intermodal traffic these trains are not processed within the
railway’s classification yard or intermodal terminals. Trains may be held awaiting delivery but will remain intact.

Bulk Terminals

For some bulk commodities such as coal and sulphur, planning for train delivery at destination is the final step of
an operational planning process that began with the train’s initial departure from origin. The movement of loaded
unit trains will often be actively managed on a daily basis between the shipper, railway and the receiving terminal
constantly updating the estimated time of arrival and ensuring coordination with terminal activities and
capabilities. The final plan for the movement of the train into the terminal will usually be confirmed prior to the
train’s arrival at destination.

108 CP uses the terms “closed gate” and “open gate”.
109 CP and Teck Coal have staff physically located at Westshore Terminals that participate in operational planning to schedule the arrival of
loaded coal trains with terminal requirements for blending and ship loading.
The large lot sizes associated with bulk commodities combined with capacity constraints for both the railway and the terminal operator make effective communication and planning processes between the parties critical. For the railway, a delay in delivering a unit train will create a need to hold it either within the railway’s yard or on a rail siding on-line. For a terminal operator the timely arrival of trains in the proper sequence is important. Even coal is not a homogeneous commodity and must be segregated within the terminal by grade of product.

**Container Terminals**

Much like bulk unit trains export containers are delivered by the railway to container terminals¹¹⁰ in trainload lots. The railways typically operate a fixed number of trains to the port terminals on daily basis and will deliver both loaded and empty containers and return with loaded import containers that have been received at the port. As the interface point between shipping lines and railways, both of whom are trying to deliver and receive containers, container terminals rely on effective communication, planning and consistency in their operations in order to remain fluid.

*Where problems can occur*

**Problem: Railway Unable to Deliver as Planned**

Whether at a bulk terminal or a container terminal the railway may at times be unable to deliver a train as planned. The reasons for this can be attributable to either the railway or the terminal and may result from circumstances that are beyond the control of either party.

<table>
<thead>
<tr>
<th>Primary Cause</th>
<th>Underlying Causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Railway service disruptions</td>
<td>• Local weather related disruptions impacting railway operations delay train delivery</td>
</tr>
<tr>
<td></td>
<td>• Railway terminal congestion</td>
</tr>
<tr>
<td></td>
<td>• Asset failures (crews or locomotives)</td>
</tr>
<tr>
<td>Port Terminal Congestion</td>
<td>• Weather related disruption impacting terminal processing activities – i.e. high winds</td>
</tr>
<tr>
<td></td>
<td>• Weather related disruptions impacting ship arrival</td>
</tr>
<tr>
<td></td>
<td>• Mechanical failures at port terminal operations</td>
</tr>
<tr>
<td>Ineffective Communication / Planning</td>
<td>• Inaccurate ETA information provided by railways</td>
</tr>
<tr>
<td></td>
<td>• Ineffective operational communication processes between railways and shippers</td>
</tr>
</tbody>
</table>

¹¹⁰ An exception to this practice would be at the Port of Montreal where the port owned and operated railway interchanges traffic with CN and CP at the port and then manages all switching activities for individual terminals within the port.
Impacts

Interruptions to railway delivery processes for bulk commodities and export container traffic will generally result in impacts on customers, terminal operators and railways.

Increased Costs

Terminals may incur higher operating costs due to higher shift differentials for labour during off peak hours. Railways may also incur higher costs in the form of unproductive crew costs of trains are held out of terminals and must be re-crewed prior to delivery.

Delayed Shipments

For customers such as coal and sulphur shippers who operate train sets in closed loop systems delays at destination with one train will delay the return of the train for subsequent loading can result in lost shipments.

4.34 The Importance of Communication Processes

As is noted above, railways’ and shippers’ operations processes are intertwined and therefore interdependent. Effective communication between railways and shippers regarding operational issues that may affect the rail logistics chain can allow both parties to more effectively plan their operations and minimize disruption. While disruption to services is always inconvenient, both shippers and railways have a responsibility to create communication processes to allow each other to minimize the effect of disruptions through adjustments to their operations. While both CN and CP have processes for notifying customers of major service disruptions, on a day to day basis, many customers do not have access to accurate information regarding the time of arrival of local train services and this frustrates their efforts to optimize their own logistics planning activities. However, communication between railways and shippers includes the need for railways to have reliable information regarding their customers’ future transportation demand. Railways and their customers both spend considerable time forecasting their future logistics requirements. These forecasts enable railways and shippers to plan their capital and operating budgets and ensure that they can satisfy their joint customers’ future demand. However, this process of determining future demand for both the shippers and railways is an uncertain science. Shippers must anticipate and forecast the behaviour of both their customers and their competitors. Railways must consider not only the needs of their shippers but also their investors and each organization may have a different view of the risks that attend to investment in the railway capacity required to handle projected demand. For this reason, even when shippers can provide detailed and well researched demand forecasts to railways, the potential for disagreements about the appropriate level of investment in capacity can still occur.
Appendix 1  Co-production Initiatives

**Terminal Switching Agreement - Deltaport Container Terminal (CN-CP)**

July 2008 – CN and CP established an operating agreement to share rail switching operations for intermodal trains at Deltaport container terminal at Roberts Bank, B.C. Rail switching services for the movement of intermodal container cars into the container terminal’s rail yard for loading and unloading of ocean containers is now performed by a jointly owned rail subsidiary.

**Haulage Agreement – Southern Ontario (CN-CSXT)**

January 2006 – CN and CSXT enter into haulage agreement whereby CN will haul CSXT traffic to and from Sarnia, Ont., and CSXT connections in Buffalo, N.Y., and Toledo, Ohio. The agreement also provides for CN to transport long-haul CSXT traffic destined for interchange to Canadian Pacific Railway London, ON replacing the existing CP-CSXT interchange at Chatham, ON.

**Trackage Rights and Haulage Agreement – Canada / U.S. (CN-BNSF)**

January 2006 – CN and BNSF enter into a series of agreements involving exchange of rail infrastructure, trackage and haulage rights in Vancouver, B.C., Chicago, and between Memphis and southern Illinois. Key provisions of these agreements include:

- Assumption by CN of operational, dispatching and maintenance control of 12 miles of joint track between the Fraser River Bridge in New Westminster, B.C., and ocean terminals on the south shore of Burrard Inlet.
- In Chicago BNSF operational, dispatching and maintenance control of CN's Corwith Tower interlocker, and trackage rights on CN for 30 miles between Corwith and Joliet, Ill., and on two miles of CN's 49th Street line.
- BNSF trackage rights on CN's main lines between Memphis and southern Illinois.

**Reciprocal Switching and Access Agreements - Port of Vancouver (CN-CP)**

2004 – CN and CP establish a series of agreements to improve rail operations efficiency for traffic moving to and from the Port of Vancouver. Key provisions of these agreements included:

- CP access to intermodal facilities at Fraser Surrey Docks via CN’s main line
- Reciprocal access for CN and CP to provide direct access to Neptune Terminals for CP potash trains and direct access to Pacific Coast Terminals for CN sulphur trains
- Reciprocal interchange provisions at CP’s Coquitlam Yard and CN’s Thornton Yard
**Slot Sharing Agreement – Edmonton to Coho, BC (CN-CP)**

November 2004 – CN and CP established a slot-sharing agreement permitting CP to move eight trains a week of bulk commodities over CN’s line between Edmonton and CP’s network at Coho, B.C. Under the arrangement trains are operated by CN train crews and equipped with CP locomotives.

**Directional Running – Ontario (CN-CP)**

November 2004 – Agreement to provide directional running over about 100 miles of parallel CPR and CN track in Ontario between Waterfall, near Sudbury, and Parry Sound. Trains are operated in the eastbound trains over CN track and westbound trains over CP track.

**Haulage Arrangement – Ontario (CN-CP)**

November 2004 – CN and CP established a haulage arrangement to allow CN freight to move over a 300 mile section of CP track in Ontario between Thunder Bay and Franz.

**Trackage Rights and Haulage Agreement – United States (CP-NS)**

2004 - CP and Norfolk Southern (NS) established reciprocal trackage rights, freight haulage and yard services agreements to increase operational efficiency and enhance rail service to customers in northern New York and the Detroit – Chicago corridor. Key provisions of the agreement include:

- Consolidation of CP and NS freight marshalling at yards in Buffalo and Binghamton whereby shifted its operations to NS’ yard in Buffalo and NS shifted its operations to CP’s yard in Binghamton
- Haulage agreement whereby CP transports NS freight traffic between Rouses Point and Saratoga Springs, New York
- Trackage rights agreement whereby NS operates its own trains over CP’s line between Saratoga Springs and Binghamton
- Trackage rights agreement whereby CP operates its trains between Detroit and Chicago over Norfolk Southern’s line

**Trackage Rights and Haulage Agreement – United States (CN-CP-NS)**

2004 – CN, CP, and NS entered into a three party arrangement providing haulage and trackage rights to CP and NS respectively for the movement of CN and Norfolk Southern traffic moving between eastern Canada and the eastern U.S.
## Appendix 2  Canadian Short Line and Regional Railways

<table>
<thead>
<tr>
<th>Province</th>
<th>Railway</th>
<th>Reporting Mark</th>
<th>Miles</th>
<th>Owner / Lessee</th>
<th>Op Start</th>
<th>Previously</th>
<th>Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB</td>
<td>Boundary Trails Railway Company</td>
<td>BTRC</td>
<td>84</td>
<td>Cooperative</td>
<td>2009</td>
<td>CP</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Fife Lake Railway</td>
<td>FLR</td>
<td>60</td>
<td>Cooperative</td>
<td>2005</td>
<td>CP</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Great Western Railway Ltd.</td>
<td>GWR</td>
<td>308</td>
<td>Cooperative</td>
<td>2000</td>
<td>CP</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Red Coat Road and Rail Ltd.</td>
<td>RCRR</td>
<td>74</td>
<td>Cooperative</td>
<td>1999</td>
<td>CP</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Southern Rails Cooperative Limited</td>
<td>SRCL</td>
<td>44</td>
<td>Cooperative</td>
<td>1990</td>
<td>CN</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Thunder Rail Ltd.</td>
<td>TR</td>
<td>19.5</td>
<td>Cooperative</td>
<td>2005</td>
<td>CN</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Torch River Rail Inc.</td>
<td></td>
<td>30</td>
<td>Cooperative</td>
<td>2007</td>
<td>CP</td>
<td>Provincial</td>
</tr>
<tr>
<td>SK</td>
<td>Wheatland Railway Inc.</td>
<td></td>
<td>46</td>
<td>Cooperative</td>
<td>2002</td>
<td>CN</td>
<td>Provincial</td>
</tr>
<tr>
<td>MB</td>
<td>Keewatin Railway Company</td>
<td>KR</td>
<td>185</td>
<td>First Nations</td>
<td>2006</td>
<td>CN</td>
<td>Provincial</td>
</tr>
<tr>
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<td>Tshiuetin Rail Transportation Inc.</td>
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