

THE MTS/STAS
GROUP

The Economics of Cargo Co-Terminalization

*strategic
transportation
& tourism
solutions*

*Prepared for
Aéroports de Montréal,
The Greater Toronto Airport Authority,
and the Vancouver International Airport Authority*

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Prepared for

Aéroports de Montréal

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1.0 Introduction

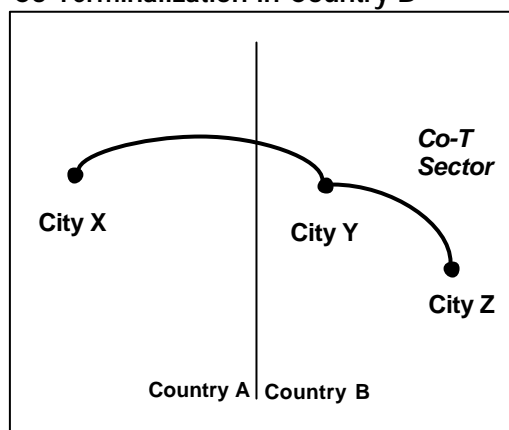
1.1 What is Cargo Co-Terminalization?

Co-terminalization traffic rights allow a carrier to serve two or more points in a foreign country with the same aircraft. It does not allow the carriage of traffic between cities in the foreign country – only traffic which originates in (or is destined to) the carrier's home country can be carried on to the second and following points in the foreign country. In some cases, co-terminalization flights offer a carrier better economics than serving multiple points in the foreign country with separate non-stop services.

Canada and the U.S. have an air services agreement (signed in 1995) which grants co-terminalization rights to both Canadian and U.S. carriers for passenger and combination flights, and for all-cargo flights where aircraft which weigh less than 35,000 pounds.¹ The treaty currently does not allow co-terminalization rights for all-cargo traffic with larger aircraft. This is the only co-terminalization exclusion in the Canada-U.S. air services agreement, and such a weight based exclusion it is rarely found elsewhere in the world.

Unrestricted cargo co-terminalization traffic rights would allow a Canadian carrier to carry Canadian originating or destined cargo shipments with any size aircraft to and from multiple points in the U.S. on the same plane. It would also grant U.S. carriers the same right in Canada.

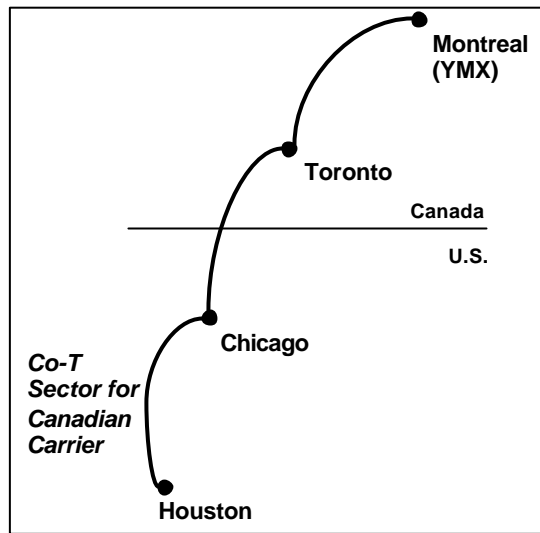
Figure 1-1:
Co-Terminalization in Country B



¹ To put this in context, the typical 727 freighter used in Canadian cargo services weights in the range of 200,000 pounds.

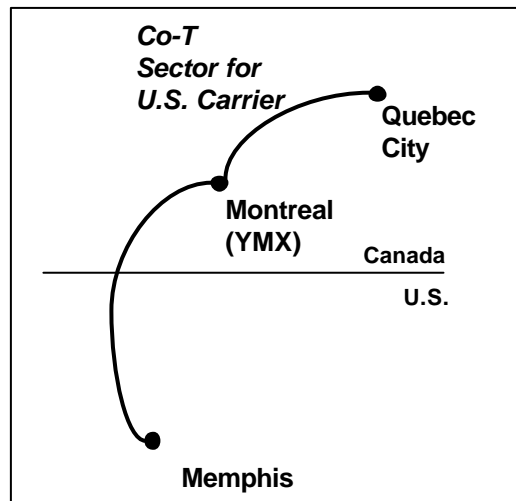
Canadian Air Carrier Example. With co-terminalization rights, a Canadian air cargo carrier could originate a flight in Montreal, fly on to Toronto, then cross the border to Chicago and fly on to Houston. Multiple stop routes are common in the air cargo industry, as they have favorable economics. A co-terminalization traffic right would allow the Canadian carrier to carry Canadian originating shipments to Chicago and to Houston. It would not allow any U.S. domestic traffic to be carried between Chicago and Houston.² On the return flight, shipments originating in Houston or Chicago and destined to Canada could be picked up. Again, domestic shipments could not be carried between Houston and Chicago.

Figure 1-2:
Canadian Carrier Co-Terminalization in the U.S.



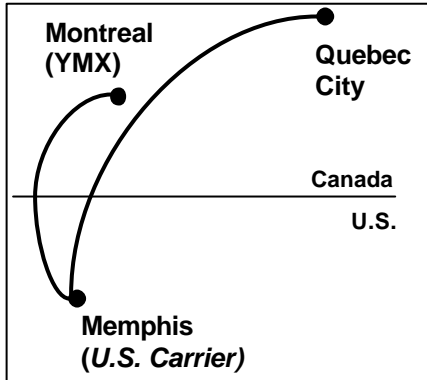
U.S. Air Carrier Example. From the U.S. side of the border, cargo co-terminalization traffic rights would allow a U.S. carrier, such as FedEx, to fly from Memphis to Montréal, drop off U.S. originating shipments, and fly on to Québec City, again dropping off U.S. originating shipments. No Canadian domestic cargo shipments could be carried between Montreal and Québec City. On the return flight, FedEx could pick up U.S. destined shipments in Québec City, fly back to Montréal and pick up U.S. destined shipments originating in Montreal, and then fly on to Memphis. It could not carry any Canadian domestic cargo from Québec City to Montréal.

Figure 1-3:
U.S. Carrier Co-Terminalization in Canada

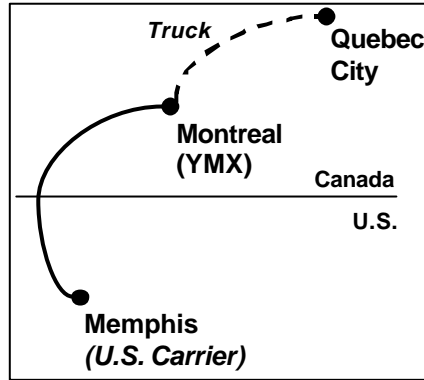


² The carriage by a Canadian air cargo carrier of U.S. domestic shipments between Chicago and Houston is referred to as cabotage. Cabotage traffic rights are not allowed in the Canada-U.S. air services agreement, and would be illegal under U.S. (and Canadian) legislation.

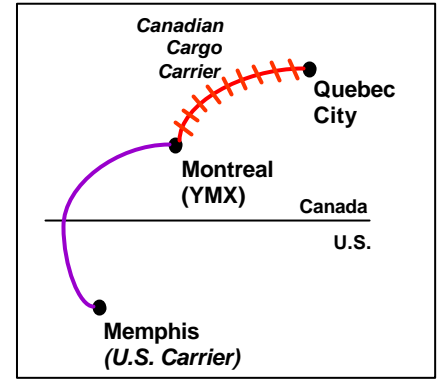
Without co-terminalization rights, FedEx' choices for serving Québec City are to fly a separate non-stop flight from Memphis to Québec, truck cargo from Montreal to Québec, or to arrange for a Canadian cargo carrier to fly the U.S. originating shipments from Montreal to Québec, after the shipments have been cleared by Canadian Border Services in Montreal.



Case A: No Co-Terminalization. Two Separate Flights.



Case B: No Co-Terminalization. Truck transport from Montreal to Quebec City.



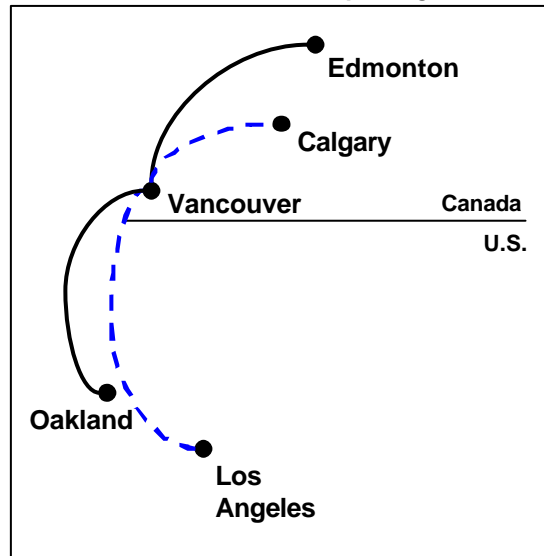
Case C: No Co-Terminalization. 3rd Party Canadian Cargo Carrier from Montreal to Quebec City.

Co-Terminalization of multiple flights.

Co-terminalization traffic rights could also allow somewhat more complex routings, with a carrier exchanging international (not domestic) shipments between its own aircraft at a point in a foreign country.

For example, with such co-terminalization rights, UPS could fly two aircraft to Vancouver, one from both Los Angeles and Oakland, dropping off U.S. originating shipments in Vancouver. In Vancouver it could then switch Calgary destined shipments from the Oakland flight to the Los Angeles originating flight -- which would then fly on to Calgary. Similarly, cargo destined to Edmonton could be switched from the Los Angeles flight to the Oakland originating flight -- which would then fly on to Edmonton. The Oakland and Los Angeles flights would not be able to carry Canadian domestic shipments between Vancouver and Calgary or between Vancouver and Edmonton.

Figure 1-4: Co-Terminalization of multiple flights



The co-terminalization of multiple flights would allow two aircraft to do the work of three or more.³ Alternatively, it would allow the two aircraft to do the work of three or more aircraft plus trucking operations.⁴

1.2 What Co-terminalization does not include

Contrary to the claims made by some, cargo co-terminalization would not allow U.S. carriers to:

- carry Canadian domestic cargo traffic between Canadian points served, or
- carry Canadian domestic cargo traffic via their U.S. hubs.

Both of these would be cabotage, and neither Canada nor the U.S. allow cabotage services. InterVISTAS has been informed that U.S. air cargo carriers have never asked for either of these rights, nor has the U.S. government asked for these rights.

1.3 Why has Canada Opposed Cargo Co-Terminalization?

Current Canadian cargo carriers may have modest financial benefits from the prohibition on transborder co-terminalization right for large cargo aircraft. This is because for a few Canadian destinations, the U.S. carriers currently utilise Canadian cargo charter carriers to move their shipments from a Canadian gateway. For example, U.S. cargo carriers fly to Calgary, but not to Edmonton. They utilise Canadian cargo charter air carriers (or trucking carriers) to move their cargo to Edmonton. Of course, the bulk of transborder air cargo already moves directly to the major Canadian cities on U.S. carriers, and it is only a modest portion of transborder air cargo that moves beyond the gateways on Canadian charter carriers.

Some claim that the prohibition against co-terminalization is used by Canada to offset “scope clauses” in the collective agreements of some U.S. carriers that reserve flying for U.S. pilots where their air carriers have traffic rights. While Canadian cargo carriers may dislike such provisions that require a U.S. air carrier to use its own pilots and aircraft for its own transborder services, Canadian trade policy should not be used as a tool to intervene in U.S. collective bargaining, nor force a U.S. carrier to use a Canadian carrier to transport the U.S. carrier’s traffic.

³ That is, one flight to each of Vancouver, Calgary and Edmonton, although potentially each of Los Angeles and Oakland would need separate flights to the three Canadian cities. It may be more likely that the U.S. cargo carrier would route one aircraft from Los Angeles to Oakland, from where three flights would go to the Canadian destinations.

⁴ For example, cargo destined to Edmonton could be trucked from Calgary. Cargo originating in Oakland destined for Edmonton could be trucked or flown domestically from Oakland to Los Angeles.

2.0 What Traffic is “At Risk”?

While theoretically, Canadian cargo air carriers may lose some traffic if co-terminalization traffic rights are granted to U.S. carriers,⁵ the traffic at risk is a small portion of their overall traffic.

- First, Canadian domestic cargo traffic is unaffected and must continue to move via Canadian cargo carriers. While statistics are not publicly available, it is believed that the majority of air cargo moving on Canadian domestic air cargo carriers is domestic traffic, and only a minority of traffic is onward carriage of transborder shipments.
- Second, the large majority of transborder cargo traffic is already carried non-stop by U.S. carriers to their end destination. U.S. carriers already serve Vancouver, Calgary, Winnipeg, Toronto, Hamilton, Ottawa, Montreal, and Halifax. Almost all transborder air freighter traffic to these eight gateways is already flown by U.S. air cargo carriers.
- Third, for transborder traffic *moving* beyond the eight Canadian gateway cities, some of it is trucked to final destination, and the loss of this traffic is not a threat to Canadian air cargo carriers. For example, we are informed that U.S. air cargo companies use trucking for some of their cargo going beyond the Calgary gateway to Edmonton.
- Fourth, for transborder traffic *flying* beyond the eight Canadian gateway cities, much traffic is moving to communities where traffic levels are too small to justify a flight by a large freighter. Thus this traffic, which is handled beyond the gateway by Canadian cargo carriers, is not at risk.
- Only a small amount of traffic is currently flown beyond the eight gateway cities in volumes sufficient to justify a large freighter aircraft, and this is all that is at risk from the granting of co-terminalization traffic rights.

In order to justify continuing a large freight aircraft onwards from an initial Canadian gateway, the potential onward co-terminalization shipment volumes have to be large enough to justify operation by a large aircraft, and yet small enough to not warrant non-stop service from the U.S. The communities fitting into this band are in fact quite limited.

The amount of domestic cargo capacity at risk from the granting of co-terminalization is estimated to be only 6% of the traffic carried by Canadian domestic air cargo carriers, a small portion of their total cargo capacity. Total weekly domestic all-cargo capacity

Only 6% of the traffic carried by Canadian domestic air cargo carriers is at risk from granting of co-terminalization traffic rights

⁵ It should be noted that cargo co-terminalization rights would grant new rights for Canadian cargo carriers to fly to the U.S. Whether they choose to utilise such rights is a commercial matter.

is approximately 18 million tonne-km.⁶ The amount of cargo at risk of co-terminalization is estimated to be approximately 1.1 million tonne-km per week, yielding the 6% “at risk” estimate.

The estimation of “at risk” traffic identified routes where traffic volumes may be sufficient to justify a co-terminalization flight.⁷ (For these cases, the calculation of “at risk” air cargo traffic did not include cargo currently trucked to final destination, which may be transferred to a co-terminalization flight.)

⁶ This value is derived from OAG schedules and industry intelligence on carriers whose schedules are not included in OAG.

⁷ Potential co-terminalization routes considered were those that involved flights between a gateway airport and a non-gateway airport. Volumes on a single carrier had to be sufficient to justify that carrier operating a co-terminalization flight for its own cargo. Thus it was assumed that FedEx would not carry UPS shipments on its co-terminalization segment for either commercial or regulatory reasons. In assessing which flights may be at risk, assumptions were made which would likely overstate the case for operating a co-terminalization flight. E.g., an 80% load factor was assumed for transborder cargo operations. This was applied to the capacity on potential co-terminalization routes to estimate actual cargo volumes on these routes. These volumes were compared with the capacity of the aircraft typically used in carrying transborder cargo to and from the gateway airport. Dividing the volumes for each city pair by the gateway aircraft capacity yields the gateway aircraft load factor. If this is sufficiently high, carriers may find it feasible to carry traffic beyond the gateway to the second point. A minimum threshold was assumed above which co-terminalization could be desirable, and the capacities for all gateway-non gateway city pairs with sufficient volumes were added to produce a total amount of capacity where co-terminalization is feasible. This was compared against the total domestic capacity calculated above.

3.0 What are the Economics of Co-Terminalization

3.1 Introduction

The economics of cargo co-terminalization can be illustrated by analysing and comparing the route costs incurred by a cargo carrier with direct flights (with or without trucking) versus co-terminalized flights. This study looked at the rough operations costs of two sample scenarios:

- *Scenario 1:* A Memphis-Vancouver flight operated with a Boeing 727-200 and a Memphis-Calgary flight operated with an Airbus A300 are compared to a co-terminalized operation with a Memphis-Calgary-Vancouver routing operated using an MD-11.
- *Scenario 2:* Co-terminalized operation (Memphis-Calgary-Edmonton) compared to a Memphis-Calgary operation and then cargo transfer to truck or third party domestic air cargo charter for Calgary-Edmonton.

Note that in Scenario 1, co-terminalization merely replaces two *existing* non-stop flights by *U.S. pilots* with a single two-stop flight by *U.S. pilots*. The existing operation in Scenario 1 does not involve any flying by Canadian pilots, and thus co-terminalization operation would not have any impact on Canadian carriers or their pilots.

It should be noted before proceeding that costs will vary by carrier, sometimes significantly. The analysis in this section is only intended only as a *rough indication* of how costs might compare for operations with and without co-terminalization. As well, there are important customer services issues which carriers would need to consider when choosing between operations with and without co-terminalization. The main purpose of this section is to illustrate that if co-terminalization of services were to be allowed, it is not necessarily the case that co-terminalization operations would displace existing operations using domestic cargo carriers. In many cases, the economics of co-terminalization operations may be marginal.

3.2 Cost Components

To compare the economics of operations with and without co-terminalization, aircraft operating costs were calculated on a block hour basis. The cost components included in the analysis are total crew, total fuel, total insurance, total taxes, total direct maintenance, and landing fees. **Table 3-1** displays the per block hour costs by component by aircraft type. U.S. data were used since co-terminalization operations would be by a U.S. carrier.

Table 3-1:
Cost Components Per Block Hour (C\$)

	B727-200	A300	MD-11
Crew	\$2,134	\$2,035	\$2,839
Fuel	\$2,569	\$3,063	\$4,725
Insurance	\$74	\$246	\$127
Taxes	\$234	\$391	\$424
Direct Maintenance	\$1,693	\$2,237	\$2,764
Other Costs	\$225	\$254	\$395
Total	\$6,929	\$8,227	\$11,274

Source: U.S. DOT Form41 data. Based on FedEx reported 2004 costs, converted to C\$ at C\$1.25 per US\$1.

3.3 Scenario 1:

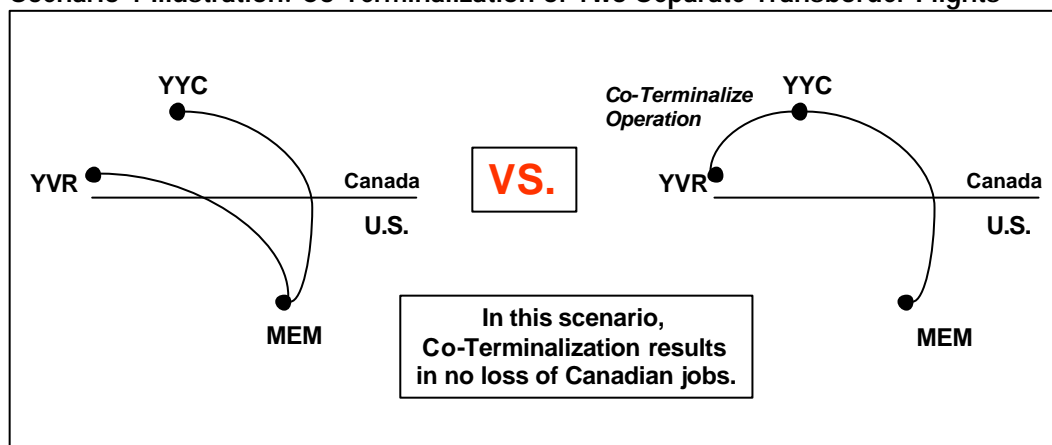
Scenario 1: Analysis.

This scenario evaluates two separate operations, Memphis (MEM)-Vancouver (YVR) (Boeing 727-200) and Memphis-Calgary (YYC) (Airbus A300) compared to a co-terminalized operation of Memphis-Calgary-Vancouver (MD-11).

The Boeing 727-200F has a cargo capacity of 25,000kg,⁸ compared to approximately 50,000 kg for the Airbus A300F. The MD-11 has a cargo capacity of 90,700kg. As a result, the co-terminalized operation in this scenario would increase the total amount of cargo capacity entering Canada.

Figure 3-1:

Scenario 1 Illustration: Co-Terminalization of Two Separate Transborder Flights



Scenario 1: Cost Comparison.

Table 3-2 and 3-3 display the costs associated with the operation of two separate flights, which result in a total return cost of \$129,400. If the operations were to be carried out on a co-terminalized basis, the total cost per return operation would be about \$121,700 for a modest savings of \$7,700 per return operation. Table 3-4 shows the cost savings of operating the co-terminalized flight compared to operating two separate flights.

One important point to note is that allowance of this co-terminalized operation would not result in any loss of traffic or revenue for Canadian air cargo carriers. The existing flights are already operated by a U.S. carrier, and the U.S. carrier would not be permitted to pick-up new domestic cargo in Calgary for transport to Vancouver. Canadian carrier domestic cargo volumes between Calgary and Vancouver would be unaffected.

⁸ The Boeing 727-200 cargo capacity ranges from approximately 20,500kg to 29,500kg, depending upon whether the aircraft was converted from passenger use or factory built as a freighter.

**Table 3-2:
Scenario 1: Total Cost of Two Separate Flights**

	Operating Cost per Return Flight
Memphis-Calgary (Airbus A300)	C\$65,300
Memphis-Vancouver (B727-200)	C\$64,100
Total	C\$129,400

**Table 3-3:
Scenario 1: Total Cost of Co-Terminalized Flight**

	Operating Cost per Return Flight
Memphis-Calgary (MD-11)	C\$90,100
Calgary-Vancouver (MD-11)	C\$31,600
Total	C\$121,700

**Table 3-4:
Scenario 1: Cost Savings with Co-Terminalized Flight**

	Total Cost Savings
Per Return Flight	C\$7,700
Monthly	C\$238,700
Annually	C\$2.8 million

Note that in Scenario 1, co-terminalization merely replaces two *existing* non-stop flights by U.S. pilots with a single two-stop flight by U.S. pilots. The existing operation does not involve any flying by Canadian pilots, and thus co-terminalization operation does not have any impact on Canadian carriers or their pilots. Canadian export shippers benefit from increased freighter capacity. Canadian airports benefit as the U.S. carrier will pay a higher landing fee at each airport as a heavier aircraft serves each airport.

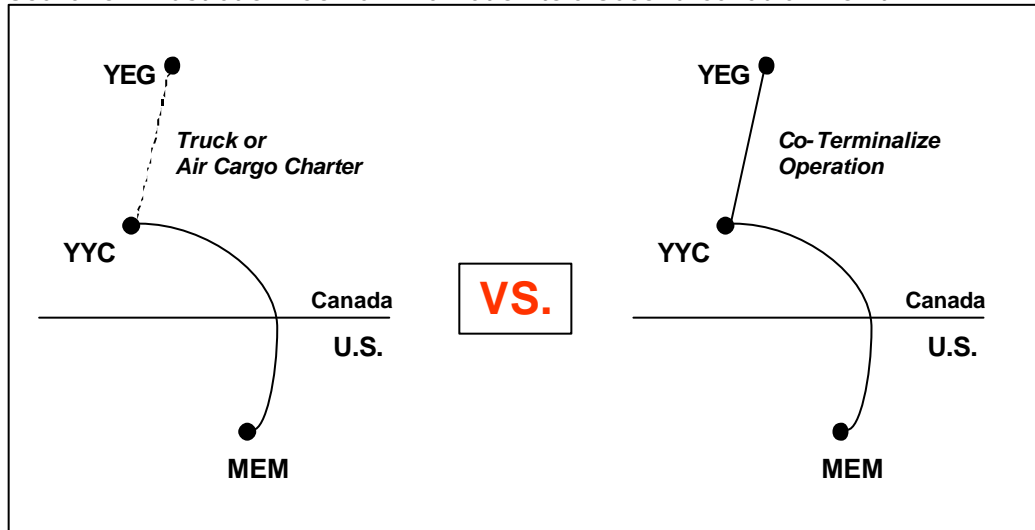
Scenario 1 does not involve any loss by Canadian cargo carriers or pilots as the existing operations are already flown by U.S. carriers.

3.4 Scenario 2

Scenario 2: Analysis

The second scenario evaluates replacing an existing Memphis (MEM)-Calgary (YYC) service operated by a U.S. carrier with a transfer of U.S. originating Edmonton (YEG) bound cargo by a domestic Canada air cargo or trucking carrier from Calgary to Edmonton. The replacement service would be a co-terminalized flight from Memphis to Calgary then on to Edmonton (Airbus A300). The analysis assumes that on the existing Airbus A300 (flight capacity 50,000kg), approximately 20,000kg are moving beyond Calgary to Edmonton.

Figure 3-2:
Scenario 2 Illustration: Co-Terminalization to a Second Canadian Point



Scenario 2: Cost Comparison

Table 3-5 displays the costs associated for the existing operation for Memphis-Calgary-Edmonton. The Memphis-Calgary part of the routing is operated by an Airbus A300 and the Calgary-Edmonton portion of the route uses truck or domestic Canada air charter.

Table 3-6 shows the estimated cost of a co-terminalized flight.

The most cost effective option is to truck the goods from Calgary to Edmonton. If cost were the only factor, co-terminalization might not threaten Canadian domestic carriers, either truck or air carriers. Air service between Calgary and Edmonton is likely to provide a higher level of service to shippers, and the air carrier may decide to incur the higher costs of either using a domestic carrier between Calgary and Edmonton, as at present, or doing a co-terminalized self operation. In this case, co-terminalization rights might produce

some savings (and possibly some further customer service benefits),⁹ but the savings are modest. It is not clear that co-terminalization rights would result in loss of traffic by the existing Canadian cargo carrier between Calgary and Edmonton, as the co-terminalization savings are modest.

The split truck/air charter option for the Calgary-Edmonton segment is somewhat more attractive than the co-terminalization flight. This is the current method of operation for some of the air carriers in market. Perhaps the major point to observe is that the economics of cargo co-terminalization are marginal, and will depend on customer service factors, rates at which Canadian cargo charter services can be obtained, wage increases at U.S. air carriers, etc. The marginal economics of co-terminalization indicate that it is not the case that cargo co-terminalization rights would

drive Canadian cargo carriers out of business. This is because very little traffic is at risk and because even where volumes are sufficient to support co-terminalization, the existing use of Canadian charter cargo carriers may be more economic.

The marginal economics of co-terminalization indicate that it is not the case that cargo co-terminalization rights would drive Canadian cargo carriers out of business.

... very little traffic is at risk, and

... continuing the use of Canadian charter cargo carriers may be more economic

⁹ For example, there would be less handling of the Edmonton cargo (it would not have to be unloaded in Calgary, transferred to another aircraft of another air carrier and reloaded). This would reduce cost and loss and damage risk, and keep the cargo in within the air carrier's own logistics system.

Table 3-5:
Total Cost of Operation with Truck or Air Cargo Charter Option

	Operating Cost per Return Flight		
	<i>Truck</i>	<i>Air Cargo Charter</i>	<i>Split Truck/Air</i>
Memphis-Calgary (A300)	C\$65,300	C\$65,300	C\$65,300
Calgary-Edmonton (Truck or Air Cargo Charter)	C\$1,200 ¹⁰	C\$16,000 ¹¹	C\$800 C\$11,000
Total	C\$66,500	C\$81,300	C\$77,100

Table 3-6:
Total Cost of Co-Terminalized Flight

	Operating Cost per Return Flight
Memphis-Calgary (A300)	C\$65,300
Calgary-Edmonton (A300)	C\$15,400
Total	C\$80,700

¹⁰ Discussions with industry reveal that a regular movement of 20,000kg going to Edmonton and points north from Calgary would cost approximately \$1,100-\$1,200 return.

¹¹ Discussions with cargo sales agents indicate that the cost per kg to transport the 20,000kg of cargo by air to Edmonton and points north from Calgary would be approximately \$0.30 to \$0.40 per kg, resulting in an air charter cost of \$12,000 to \$16,000 return. Note that this cost is an estimate. Actual costs paid by FedEx and UPS are not publicly available.

3.5 Summary

In Scenario 1, the analysis shows that the economics of a co-terminalized operation are somewhat better than compared to the operation of two separate flights. However, co-terminalization operations would not place any Canadian domestic air cargo carrier at risk, as it merely replaces two flights currently operated by a U.S. carrier with a single co-terminalized flight.

In Scenario 2, it is the most cost effective option is to truck goods between the two Canadian points. If goods are flown, for customer service reasons, for example, the co-terminalized operation is cost comparable to the current chartering to a Canadian domestic air cargo carrier, with co-terminalization having only a slight edge. Whether co-terminalization would replace chartering to a Canadian domestic carrier would be a commercial matter. However, as discussed above in section 1.4, there is only a small amount of currently domestically carried air cargo where co-terminalization may have favourable economics.