Comparative Assessment of Broadband Performance and Cost for Consumers in G7 and OECD Countries

Canada always ranks in the top half or better

Report prepared for
Rogers Communications Inc.

FINAL REPORT
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1. Executive Summary

1.1 Why was this Report developed?

This independent Report has been developed by LEMAY-YATES ASSOCIATES Inc. (LYA) on behalf of Rogers Communications Inc. (RCI) to compare key metrics of broadband Internet access services for consumers among G7 and OECD countries including Canada[1] as well as to compare these results, to the extent possible, with those published by the OECD in its Communications Outlook Report.[2] The OECD Communications Outlook Reports of recent years have usually ranked Canada well in the bottom half of OECD countries for a number of fixed broadband access metrics comparing advertised broadband speeds and pricing. These results are somewhat surprising as Canada boasts broadband networks providing services with broadband speeds from 25 Mbps to 250 Mbps downstream by both telecommunication carriers ("telcos") and cable distributors ("cablecos") with extensive population coverage.[3]

Thus, in this Report, LYA has strived to go further than the OECD report by assessing what is the real speed of broadband connections obtained by the average consumer among these countries based on a large number of user tests, using more than 52 million test results in total, reflecting the real market share of the various Internet Service providers (ISPs) in each country, and then estimating the real cost of a megabit per second (Mbps) of broadband speed as paid by consumers, based on the pricing plans offered by the various ISPs, again in each country.

[1] The 32 OECD countries covered in this Report are Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States.
[2] See the OECD Communications Outlook Report available at http://www.oecd.org/sti/telecom/outlook.
[3] In mid 2010, LYA concluded that more than 65% of Canadians already had access to broadband Internet services at advertised speeds equal to or exceeding 25 Mbps. See LYA Report entitled The Performance of Canada's Consumer Broadband Networks in 2010, July 2010, p. 3, available at www.lya.com.

LYA has used the latest statistical information available for the analyses in this Report. Sources of information used include public reporting from the European Union, the OECD broadband portal, public reporting from individual country regulators and public reporting of individual service providers. In the vast majority of cases, information is valid for year-end 2010 or the first half of 2011.

The key metrics benchmarked by LYA for this Report are:

1. The Household Penetration for Fixed Broadband Internet service, based on statistics reported by regulatory agencies.
2. The Average Cost of a Megabit per Second (Mbps) of Downstream Broadband Internet speed, as paid on a monthly basis by the average user, based on the Average Measured Fixed Broadband Speed per country.
3. The Average Measured Fixed Broadband Speed over a 24-hour period: this metric was developed based on more than 52 million actual downstream speed tests conducted by the end users themselves over a 3-month period in mid-2011,[4] taking into account the market share of each broadband Internet service provider to properly reflect the market structure and availability of fixed broadband access services in each of the 32 countries.
4. The Peak Hours Average Measured Fixed Broadband Speed was derived as the average downstream speed measured during peak daily consumer usage hours, defined for this Report as 6:00 pm to 11:00 pm local time.
5. The Average Monthly Broadband Subscription Cost is pricing paid by the average consumer in each country based on mid 2011 service plans, reflecting the market share of the various ISPs as well as the proportion of broadband users subscribing to broadband plans with advertised speeds below and above 10 Mbps.
6. The Household Broadband Benefit Index, reflecting the actual Average Measured Fixed Broadband Speed measured by end users as well as the fixed broadband

[4] Using the SpeedTest web site: http://www.speedtest.com.

penetration among households in each country, is a valuable metric to compare the total benefits of broadband Internet among countries.

A couple of other pricing metrics were also derived as part of the LYA methodology and are also compared among G7 and OECD countries in this Report.

Where appropriate, we have also highlighted the results obtained specifically for Rogers Communications Inc., on whose behalf this Report was developed. All prices discussed in this Report are expressed in US dollars converted from local currency on a Purchasing Power Parity (PPP) basis.

1.2 Main Conclusion

Our main conclusion is that based on actual measured broadband speed tests conducted by end users, and taking into account the market share of individual ISPs in our analysis to reflect the actual composition of the broadband market in each country, Canada always ranks in the top half or the top quartile when compared to G7 and OECD countries for all 6 broadband metrics assessed as part of this extensive study.

Rogers' broadband subscribers on average benefit from 35% more downstream speed than the Canadian average broadband user (at 15.6 Mbps measured average on a daily basis compared to 11.5 Mbps for the Canadian average).

Rogers' subscribers actually pay 25% less compared to the average Canadian broadband consumer for each Megabit per Second of Broadband Speed they receive.

We also highlight that during Peak Hours, Rogers subscribers experience a 4.6% decline in broadband downstream speed (from the average over a 24-hour period), compared to

an average decline of 5.8% for all Canadian broadband subscribers and an average decline of 6.6% for broadband subscribers in OECD countries.

The results achieved by Canada using our methodology based on real user speed tests indicate that Canada's ranking among OECD countries is always much better than rankings published by the OECD. We attribute these differences to the following characteristics of LYA's methodology:

- The LYA methodology is based on real end-user measured speeds as opposed to advertised speeds; the difference between actual and advertised broadband speeds can be significant.

- The LYA analyses reflects the market share of individual ISPs in each country, thus if a telco with mainly DSL based broadband offerings has the highest market share, this will be reflected in our analysis;

- The LYA pricing analysis incorporates the relative split of subscribers to broadband services below and above 10 Mbps downstream speed for each country, thereby implicitly reflecting the availability and relative affordability of all ranges of broadband services.

1.3 The Results: Canada's Performance among G7 Countries

Figure 1 demonstrates that Canada's results (as well as those of Rogers where appropriate) are always in the top 3 positions among G7 countries on the six key broadband metrics we have compared in this Report.

- Canada captures the top rank with the highest broadband penetration as a percentage of households among G7 countries at 74%, significantly ahead of the United Kingdom and France at 69.2% and 69%, respectively.[5]

- Canada ranks third (i.e. has the third lowest cost) for the real end user cost of a Megabit per Second (Mbps) of Downstream Speed among G7 countries. Rogers by itself would rank second along the same metric, indicating that Rogers' subscribers obtain more bandwidth for their money than the average Canadian consumer. We highlight that Rogers' subscribers actually pay 25% less compared to the average Canadian broadband consumer for each Megabit per Second of Broadband Speed they receive (see Figure 6 in the Report for details).

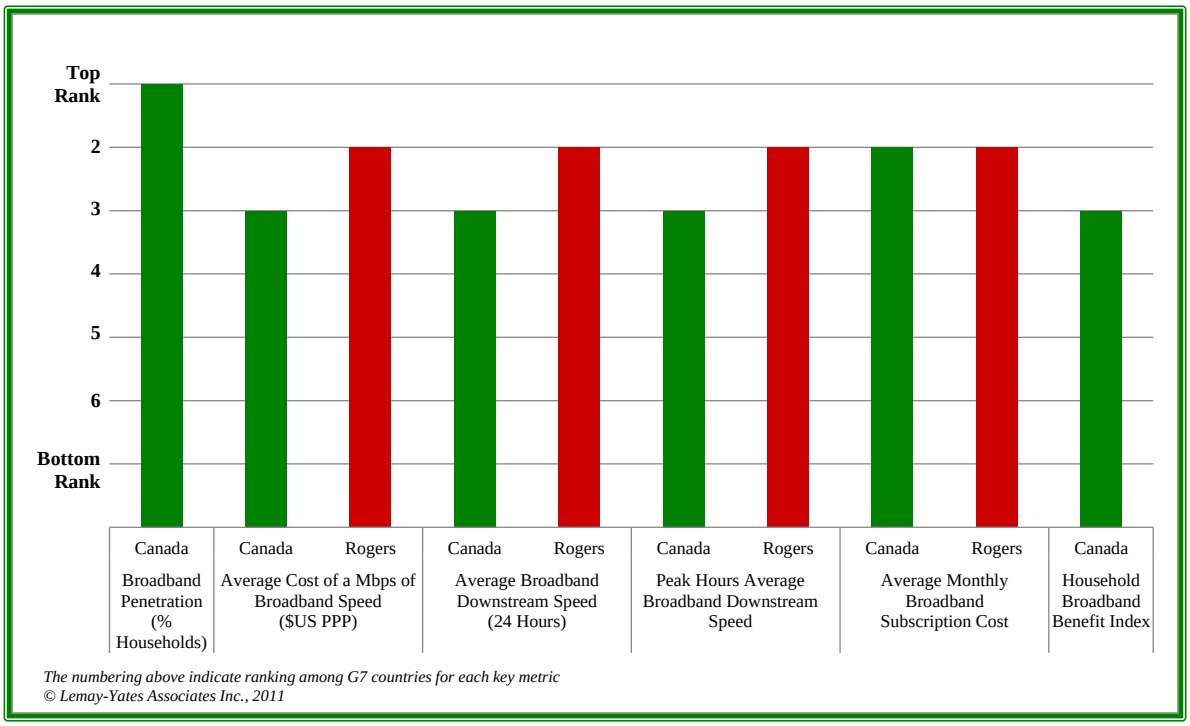
- Canada ranks third (and Rogers by itself ranks second) when compared to G7 countries for both 24-hour and Peak Hours Average Measured Fixed Broadband Speed, based on more than 52 million user speed tests. The 24-Hour Average Downstream Speed achieved by Rogers' subscribers is 35% better than the Canadian average.

- Canada (as well as Rogers) ranks second, slightly behind Italy, when comparing the Average Monthly Broadband Subscription Cost among G7 countries.

- Canada is in third position on our Household Broadband Benefit Index, which reflects the 24-hour Average Measured Fixed Broadband Speed multiplied by the Broadband Penetration among Households, behind Japan and Germany but ahead of France, the United States, United Kingdom and Italy.

[5] All data is valid for 2010 except for Japan (year-end 2009).

Figure 1 – Summary of Canada and Rogers' Broadband Metric Rankings among G7 Countries



The numbering above indicate ranking among G7 countries for each key metric
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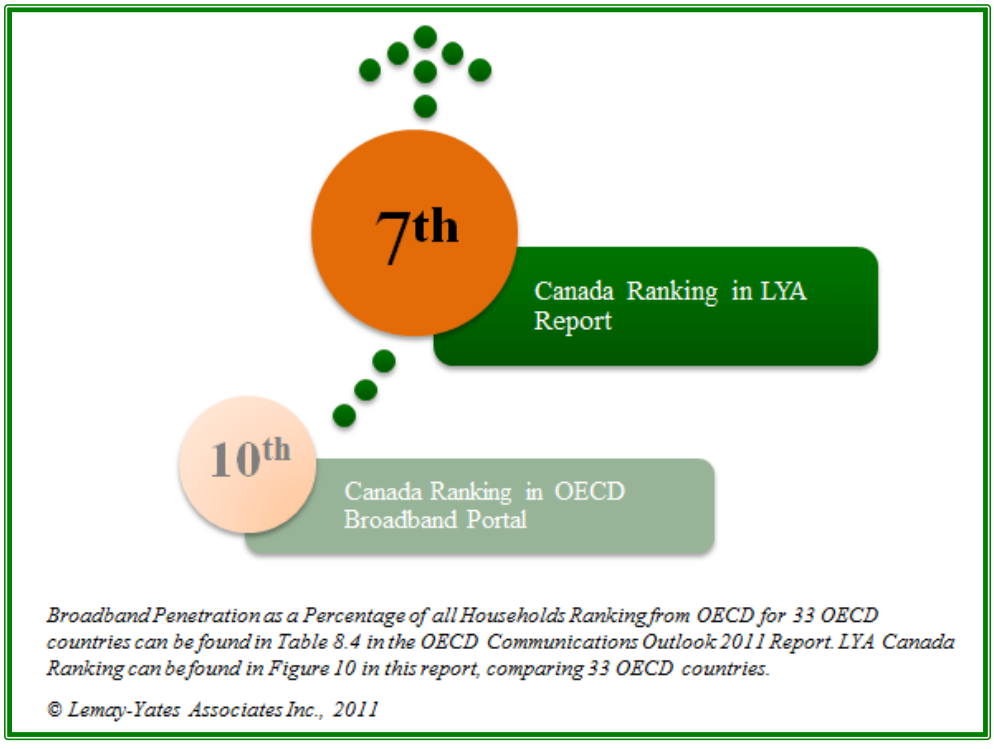
1.4 The Results: Comparison of Canada's Performance with that reported by the OECD

In terms of Broadband Penetration as a Percentage of Households, the latest available OECD data ranks Canada in 10th position among OECD countries while LYA's analysis ranks Canada in 7th position, thus in the top quartile of the 33 OECD countries included in our analysis.[6] The difference between the OECD and the LYA results is mostly due to the fact that many but not all country data points in the OECD analyses also include mobile broadband connections and that the data point used by OECD for Canada was older than that used for other countries.

Figure 2 – Canada's Ranking Comparison: Broadband Penetration as a Percentage of all Households



[6] The Broadband Penetration metric includes Iceland in addition to previously mentioned 32 OECD countries.

In terms of comparing the Average Cost of a Mbps of Downstream Speed to end users, the OECD ranks Canada in 25th position[7] using a simple average of advertised speeds per country, while LYA's analysis, based on real end user tests, ranks Canada in 12th position,[8] thus well in the top half of OECD countries.

We highlight that Rogers by itself comes in at eighth, in the top quartile of OECD countries when benchmarking the actual cost of a Mbps of downstream speed as paid by consumers.

Figure 3 – Canada's Ranking Comparison: the Average Cost of a Mbps of Downstream Speed

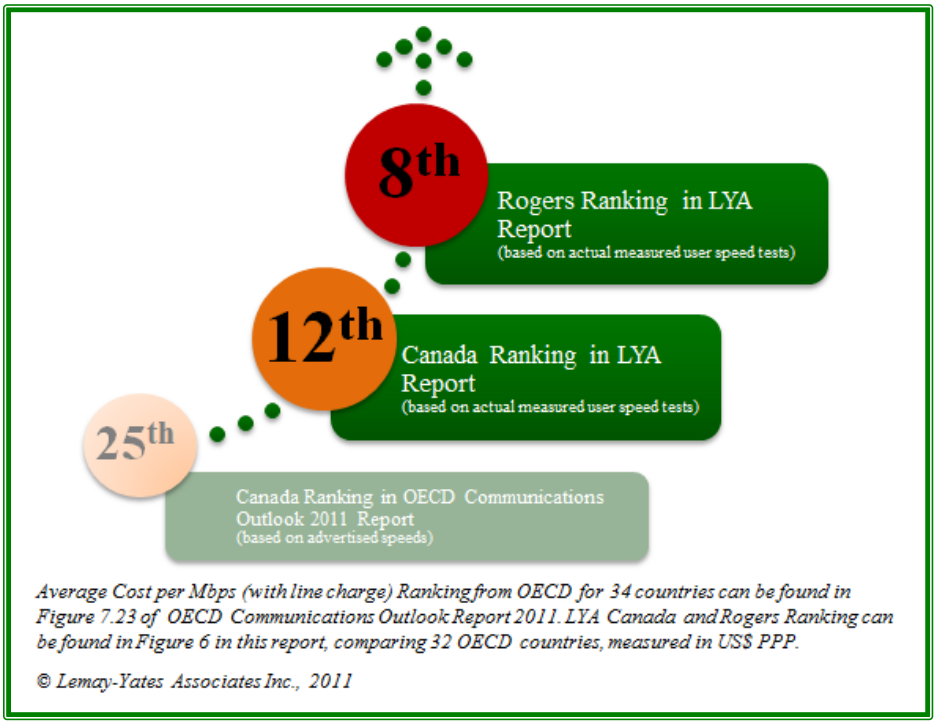


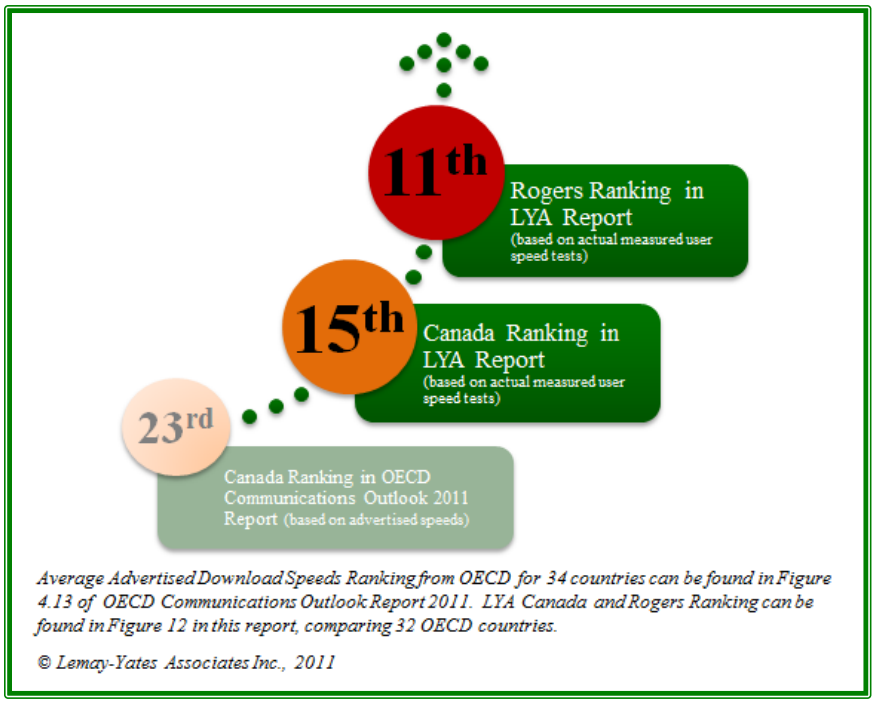
Figure 4 compares the OECD results for Canada as the average downstream speed based on advertised speeds with the LYA results based on actual measured speeds reflecting the market share of ISPs in each country. Again, Canada's position rises significantly from

[7] Out of 34 countries
[8] Out of 32 countries

23rd, in the OECD results based on advertised speeds, to 15th position based on measured speeds, thus in the top half of OECD countries.

On the same basis, Rogers comes in at eleventh, 4 positions better than the Canadian average.

Figure 4 – Canada's Ranking Comparison: Average Fixed Broadband Speed

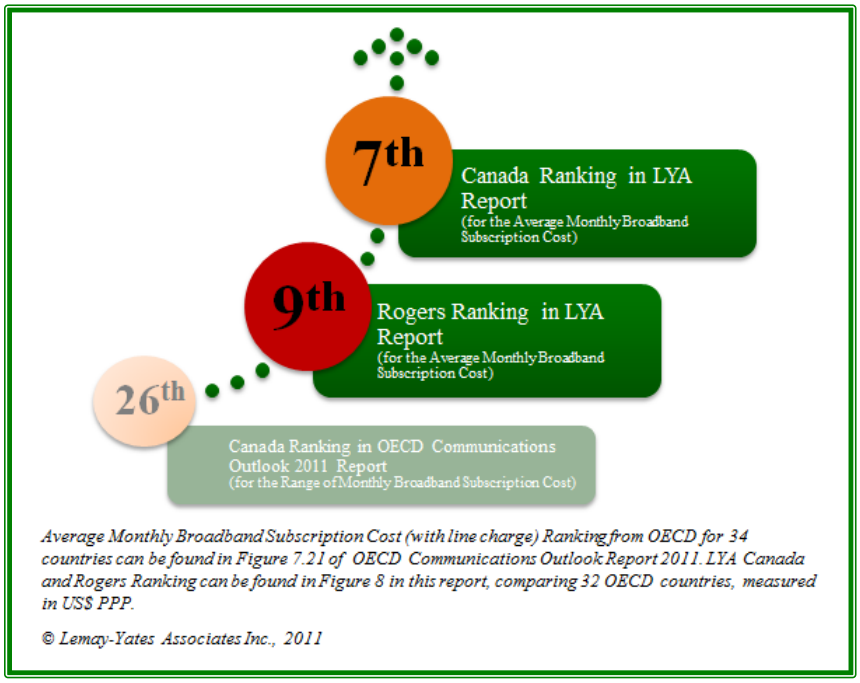


Our last point of comparison with OECD relates to the Average Monthly Broadband Subscription Cost, as shown in Figure 5. The improvement in Canada's overall position is very dramatic as it rises from 26th position in the OECD ranking to 7th position or in the top quartile among OECD countries in LYA's ranking.

We reiterate that this dramatic improvement in ranking essentially results from the fact that the LYA methodology uses more information than the average of advertised service

and price offers to derive the Average Monthly Broadband Subscription Cost for each country. It includes the market share of each ISP per country as well as the split of subscribers to broadband services below and above 10 Mbps, thus better reflecting the real monthly service cost paid by the average broadband subscriber in each country.

Figure 5 – Canada's Ranking Comparison: The Average Monthly Broadband Subscription Cost



In this case, Rogers' results is slightly below Canada and can be explained by the fact that Rogers offers few broadband service plans below 10 Mbps, thus moving the Rogers average monthly cost slightly higher than the Canadian average.

1.5 The Results: Details of Canada's Performance among OECD countries

1.5.1 Broadband Penetration per Household among OECD countries

Canada is 7th among 33 OECD countries or in the top 20%, when comparing penetration of broadband Internet per household.

The five countries reporting a broadband penetration among households higher than Canada's are (in decreasing order): The Netherlands (86%), Denmark (86%), Korea (82%), Iceland (80%), Luxembourg (78%) and Switzerland (77%). More details are provided in Section 2 of this Report.

1.5.2 The Real Cost of a Megabit per Second of Broadband Speed among OECD countries

The Average Cost of a Megabit per Second (Mbps) of Broadband Speed for consumer fixed broadband service varies from $0.87 per Mbps in Korea to $17.42 per Mbps in Mexico, based on third quarter 2011 pricing and on actual speeds measured by end users from May 1st to the end of July 2011.

Canada ranks 12th among the 32 OECD countries when comparing the Average Cost of a Megabit per Second of Broadband Speed among OECD countries, or well in the top half, as shown in the following Figure, while Rogers comes in at eighth, in the top quartile.

Subscribers to Rogers fixed broadband access service pay on average $1.99 for a Mbps of downstream speed, or 25% less than the Canadian average.

Figure 6 – Average Monthly Cost of a Mbps of Broadband Speed in OECD Countries ($US PPP)

1.5.3 Average Measured Fixed Broadband Speed among OECD countries

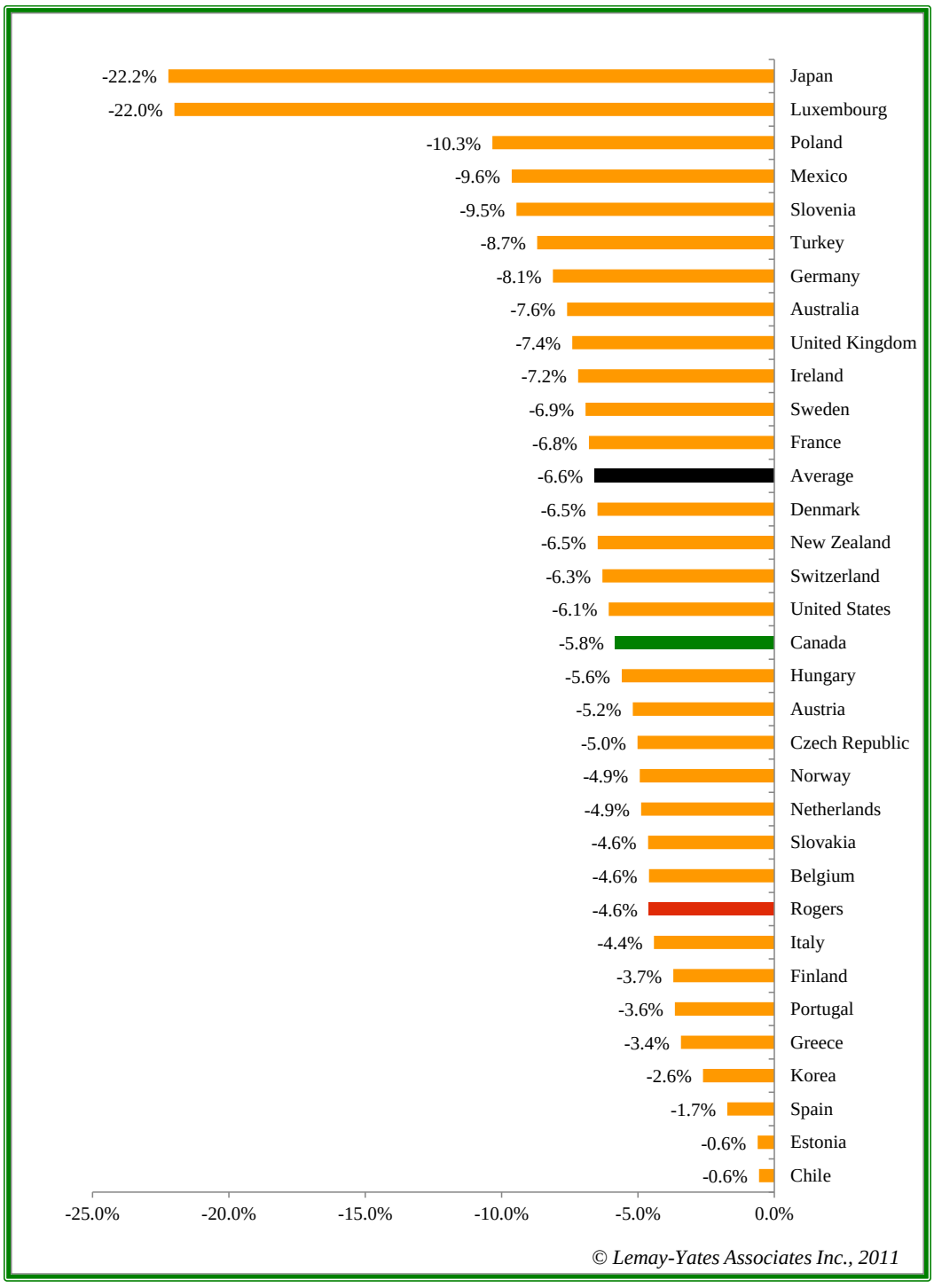
The Average Measured Fixed Broadband Speed per country varies from 2.6 Mbps (in Mexico) to 37.3 Mbps (in South Korea). Canada's performance comes in at the top half with 11.5 Mbps, in 15th place, just below the Czech Republic with 12.3 Mbps, and above the USA and France with 11.2 Mbps. Canada's overall performance remains in 15th place when comparing performance for the Peak Average Measured Fixed Broadband Speed.

The Average Measured Fixed Broadband Speed for subscribers to Rogers Communications broadband Internet service yielded an average downstream speed of 15.6 Mbps, or more than 35% better than the Canadian average.

Users in all countries experienced a decline in downstream performance during peak usage hours from 18:00 to 23:00 local time. This decline ranged from more than 22% in Japan to almost no decline for Chile and Estonia with a -0.6% difference.

The Peak Hours Average Measured Broadband Speed was 10.8 Mbps in Canada, down 5.8% from the overall average, better than the average decline in OECD countries which came in at 6.6%. In the case of Rogers Communications subscribers, measured broadband speed was 4.6 % slower at peak hours, a performance level which is 20% better than the overall Canadian average and 30% better than the OECD average, as shown in the following Figure.

Figure 7 – Percent Decrease from 24-hour Average Measured Broadband Speed to Peak Hours Average Measured Broadband Speed in OECD Countries



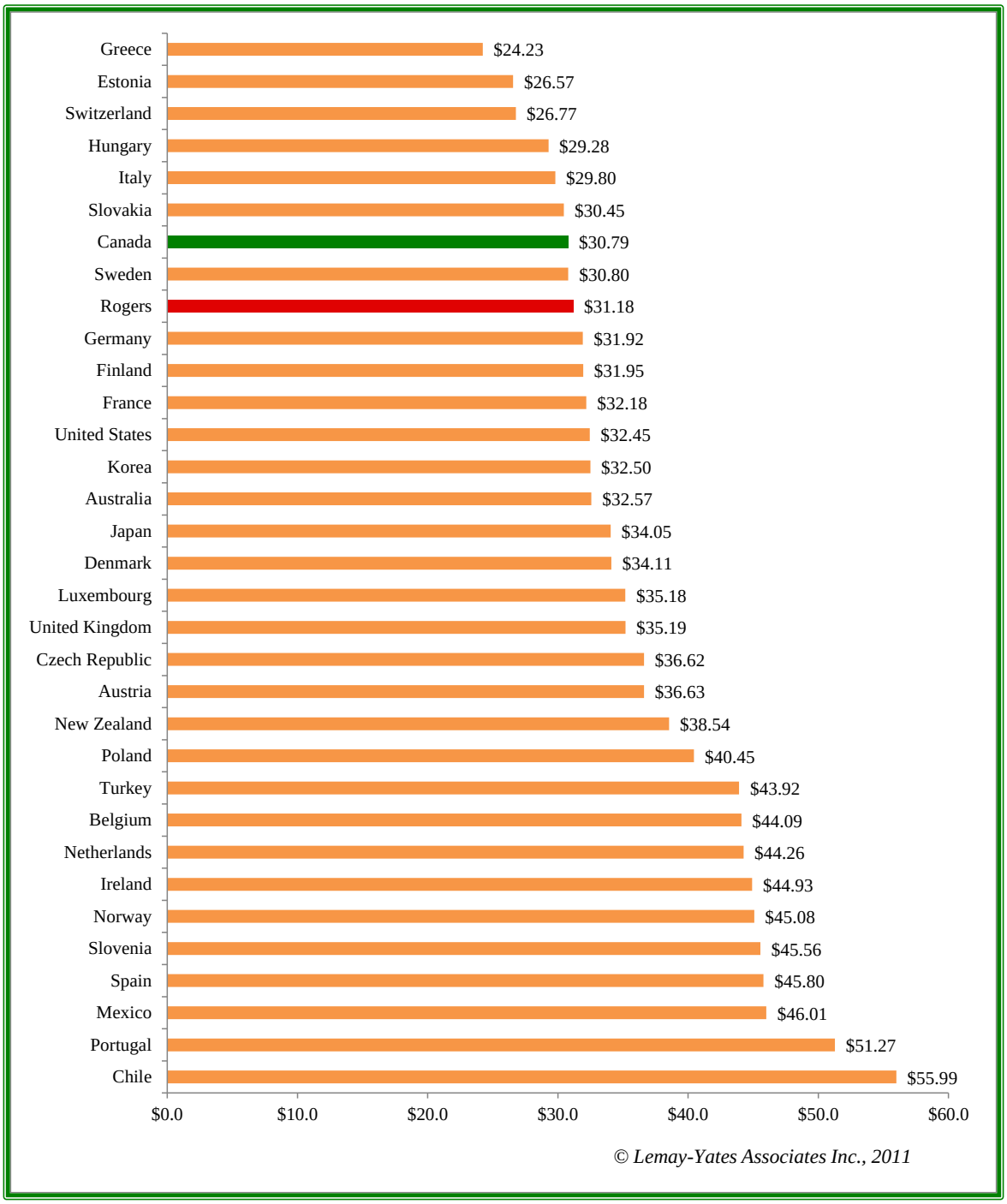
1.5.4 Average Monthly Broadband Subscription Cost among OECD countries

Canada ranks 7th among OECD countries, in the top quartile, when comparing the Average Monthly Broadband Subscription Cost paid by consumers, reflecting the relative market share of the various Internet Service providers as well as the split of subscribers to broadband services above and below 10 Mbps downstream speed.

On a USD PPP basis, the Average Monthly Broadband Subscription Cost for broadband Internet service ranges from $24.33 in Greece to $55.99 in Chile.

The Rogers average monthly cost is slightly above the Canadian average, reflecting the fact that Rogers offers only a few broadband plans below 10 Mbps, thus moving the Rogers average monthly cost slightly higher than the Canadian average.

Figure 8 – Average Monthly Broadband Subscription Cost in OECD Countries



1.5.5 Household Broadband Benefit Index

Canada ranks third among G7 countries in terms of Household Broadband Benefit Index, which measures both speed and penetration, at 8.50. Japan is first at 15.26 and Italy is last at 2.62.

Among 32 OECD countries, Canada ranks 12th in the overall Household Broadband Benefit Index. To highlight a few other results: Korea is first with an Index of 30.59, Japan is 5th, Belgium is 8th, Germany is 9th, France is 14th, the US is 15th, the United Kingdom is 18th, Australia is 19th, Italy is 29th, and Mexico is last with a Household Broadband Benefit Index of 0.36.

1.5.6 Other Observations and Conclusions from this Research

All rankings show Canada in the top half of the G7 or of the 32 OECD countries and often in the top quartile across all performance categories, displaying overall excellent positioning.

Rogers performance, on close to all metrics, is significantly better than the Canadian average, from the Average Measured Downstream Speed to the performance during peak usage periods to the real cost paid by users for a Megabit Per Second of Fixed Downstream Speed.

Canada's overall subscription rate to broadband services is especially notable – first among the G7 and seventh in the 33 OECD countries analysed.

Canada has the best performance with respect to broadband speeds and penetration when considering countries with very large geography, notably the United States and Australia.

The presence of extensive cable television networks, as is the case in Canada, is a major benefit to measured fixed broadband speeds. This is the case in all countries where cable distribution networks reach a significant percentage of the overall population.

Canada's performance, based on LYA's analyses, is always better – along every dimension analyzed – than what is reported by the most recent OECD Communications Outlook report.

The following Sections provide the detailed results with more Tables and Figures highlighting all key findings.

2. Penetration of Fixed Broadband Internet Services

Fixed household broadband penetration measures the proportion of households within a country who have subscribed to a fixed broadband Internet access service.

Fixed broadband Internet totals all broadband subscribers with a digital subscriber line, cable modem, or other high-speed technology. It also intrinsically reflects both the availability as well as the relative affordability of broadband service within a given country.

The definition of broadband Internet speeds varies among regulators. For this Report, the statistics used with respect to the penetration of broadband Internet in each country reflect the following downstream speeds defined as broadband:

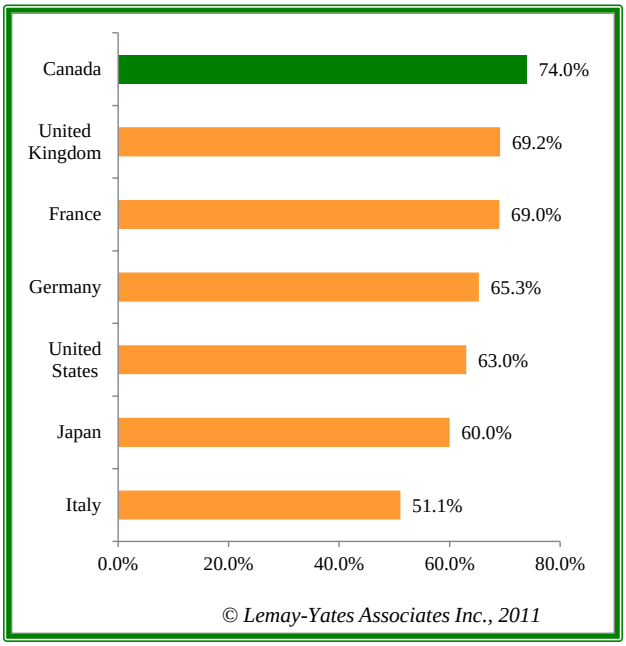
- For most EU countries: 144 kbps or higher;
- Australia and New Zealand: 256 kbps or higher;
- Canada: 128 kbps or higher;[9]
- The United-States: at 200 kbps or higher;
- Other OECD countries: downstream speeds ranging from 128 kbps, such as France, to 256 kbps.

Based on LYA's research of the broadband service offerings in 2011, the variations in the definition of broadband among the 33 countries has no impact on the results of our analyses as the service offerings that correspond to the slowest broadband services are always above 256 kbps for the lowest advertised downstream speed.[10]

[9] The Canadian Radio-Television and Telecommunications Commission (CRTC) defines high-speed Internet access as 128 kbps or faster and broadband Internet access starting at speeds of 1.5 Mbps.
[10] One Internet service provider in Poland offered a broadband service with speed up to 256 kbps.

Among all G7 countries, Canada has the highest fixed broadband penetration, at 74% of households. Fixed broadband penetration among other G7 countries ranges from 51% in Italy to 60% in Japan to close to 70% in the United Kingdom.[11]

Figure 9 – Fixed Broadband Penetration in G7 Countries (% of households)

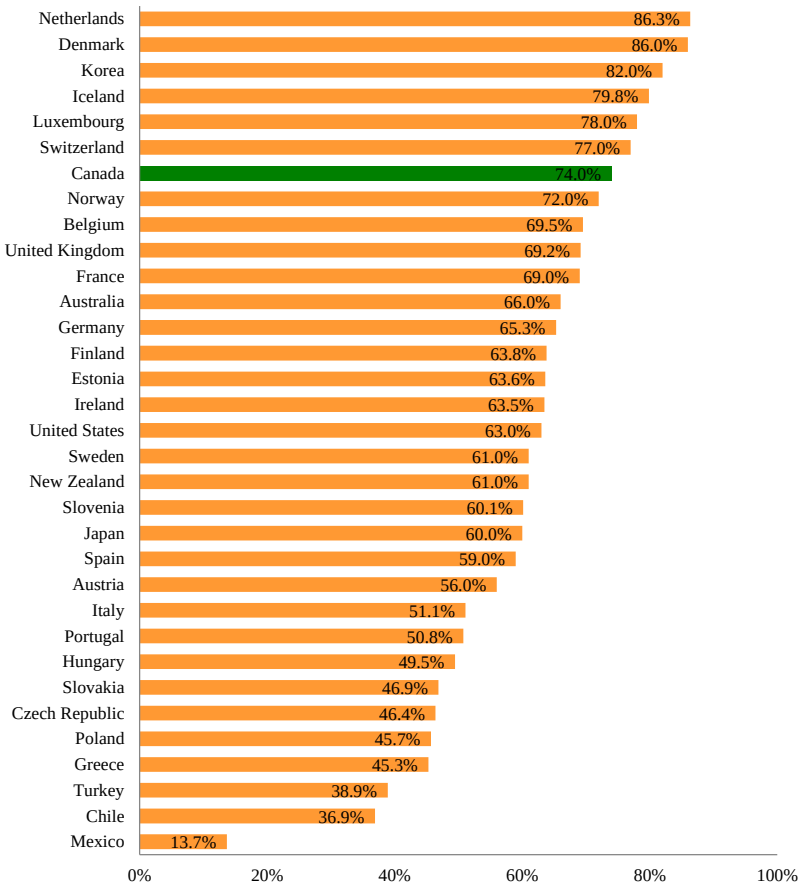


Among the 33 OECD countries surveyed, Canada ranks 7th in terms of household fixed broadband penetration, below the Netherlands reporting the highest level at more than 86% of households, as shown in Figure 10.

Mexico reports the lowest penetration of fixed broadband access penetration at less than 15% of households. The average fixed broadband penetration among these 33 OECD countries is 60.9% of households.

[11] This comparative assessment is focused on fixed broadband penetration among households. Some countries and regulators now report mobile broadband access in conjunction with fixed broadband access. This was not included in the current LYA analyses as our objective was to compare downstream speed and prices only for fixed broadband access services.

Figure 10 – Fixed Broadband Penetration in OECD Countries (% of households)



Source: All EU Countries - EU i2010 Benchmarking, from http://ec.europa.eu/information_society/eeurope/i2010/benchmarking/index_en.htm
Australia - Communications Report 1 - Australia in the digital economy: The shift to the online environment, Table 1, page 4
Canada - CRTC CMR Report 2011, page 137
Chile - Subtel Statistical Information - Series on Internet connections
France - ARCEP Electronic Communications in France: key figures - Figures for 2010, page 5
Iceland - Statistic Iceland indicate 107,011 connections for end of 2010
Japan/Mexico - OECD Communications Outlook 2011, Table 8.4 Households with broadband access
Korea - KISA Internet Usage Statistics, May 2010
New Zealand - ComCom Annual Telecom Monitoring Report 2010, p.11
Norway - Norwegian Post and Telecom Authority, "The Norwegian market for electronic communications services - 2010" report, page 20
Switzerland - Swiss Statistics 2010 from http://www.bfs.admin.ch/bfs/portal/fr/index/themen/16/04/key/approche_globale.indicator.30109.301.html?open=2#2
Turkey - ICTA, Electronic Communications market in Turkey, Quarterly Market Data report, Q1 2011, p. 38
US - FCC Report: Internet Access Services: Status as of June 30, 2010, page 9

3. Benchmarking the Average Measured Fixed Broadband Speed in G7 and OECD Countries

Many benchmarking or comparisons of broadband speeds between countries rely on general averages of advertised speeds. This approach does not reflect what consumers really obtain, since advertised and actual speeds are often quite different. Furthermore, a general average of advertised speeds by various ISPS does not reflect the differences in market share of various ISPs in each country. For example, the incumbent telecommunications carrier may have a majority market share of the broadband market which is being offered on a DSL platform while smaller all-fibre based ISPs may offer much higher speeds but have low population coverage and hence market share. Thus, an average of advertised speeds would also not reflect these differences in service availability and market share.

LYA has developed a methodology based on using consumer conducted speed tests,[12] a total of 52 million speed tests conducted over 92 days by the end users themselves in 32 OECD countries,[13] using the www.speedtest.com web site. Our objective was to assess the real fixed broadband speeds obtained in each country, reflecting not only a measured downstream speed of broadband connections but a weighted average of all broadband connection speeds along the relative market share of the Internet Services Providers in each country, yielding the Average Measured Fixed Broadband Speed in each country, as obtained by the average broadband consumer. We believe this approach provides a much better estimation of the quality of broadband service for the average consumer in each country, and thus a better methodology for benchmarking among countries.

[12] LYA acquired and analyzed raw data of user conducted speed tests from Ookla, the organisation behind the www.speedtest.com website.
[13] The only OECD countries not covered with our speed tests data are Iceland and Israel.

The results of our analyses were compared on a per country basis for 32 OECD countries as well as for G7 countries, which are the United States, France, Germany, the United Kingdom, Italy, Japan, and Canada.[14]

The following Table summarizes the number of data points for each of the 32 countries that are included in LYA's analyses.

[14] Note: the OECD includes 34 countries. LYA's data excluded Iceland and Israel and this Report thus covers 32 countries. The G8 includes Russia, but LYA's data set excluded Russia, and thus results for the G7 were assessed.

Table 1 – Geographic Distribution of Speedtest Data from OECD Countries (May 1st to July 31st, 2011)

Country	Number of Data Points Used	% of Total Data Points
Australia	2,217,551	4.3%
Austria	360,283	0.7%
Belgium	440,206	0.8%
Canada	2,440,055	4.7%
Chile	810,010	1.6%
Czech Republic	479,534	0.9%
Denmark	230,279	0.4%
Estonia	105,521	0.2%
Finland	994,558	1.9%
France	719,596	1.4%
Germany	992,326	1.9%
Greece	680,109	1.3%
Hungary	1,468,848	2.8%
Ireland	495,068	1.0%
Italy	3,040,437	5.8%
Japan	378,445	0.7%
Korea (Republic of)	129,876	0.2%
Luxembourg	40,277	0.1%
Mexico	2,228,434	4.3%
Netherlands	1,030,140	2.0%
New Zealand	305,796	0.6%
Norway	368,653	0.7%
Poland	1,566,925	3.0%
Portugal	646,832	1.2%
Slovakia	204,235	0.4%
Slovenia	234,143	0.5%
Spain	756,473	1.5%
Sweden	146,497	0.3%
Switzerland	271,221	0.5%
Turkey	741,420	1.4%
United Kingdom	6,127,761	11.8%
United States	21,379,683	41.1%
Total	**52,031,192**	**100%**

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Number of data points used from May 1 to July 31, 2011, totalling 92 days worth of data

While the Table above highlights that the US represents approximately 40% of all the end user speed tests conducted, the lowest number of tests per country recorded during that period was for Luxembourg at more than 40,000 unique speed tests.

The identity of the service provider corresponding to each end user test was used in conjunction with market share, based on LYA's research, to develop the Average Measured Fixed Broadband Speed for each country as detailed in Sections 3.1 and 3.2.

3.1 Benchmarking the 24-Hour Average Measured Fixed Broadband Speed

The following Figures highlight the Average Measured Fixed Broadband Speed in G7 and 32 OECD countries, as well as differences in the results recorded between telcos and cablecos in Canada.

Canada is the 3rd fastest among G7 countries and 15th among 32 OECD countries, or in the top half of the 32 OECD countries, averaging 11.5 Mbps, as its Average Measured Fixed Broadband Speed. These results cover all 24 hours of user tests in any given day.

Results for Canada, the United States and France fall within a similar range from 11 to 12 Mbps. South Korea, with an Average Measured Broadband Speed of 37.3 Mbps, ranks first among 32 OECD countries, ahead of Japan at second with more than 25 Mbps, with Sweden close in third place with 24.8 Mbps.

Rogers' performance comes in at 15.6 Mbps, 35% better than the Canadian average.

When compared to major telcos in Canada, Bell and Telus, Rogers achieves an average measured downstream speed of more than double that of the major telcos in Canada.[15] On average, it was found that cablecos perform much better in Canada than telcos, averaging 15.1 Mbps for the former compared to 7.1 Mbps for the latter.

[15] Similar differences were also recorded from the speed test results in other countries. Telcos with more extensive fiber the home deployment also report better average downstream speed results than those with limited or no deployment.

Figure 11 – 24-Hour Average Measured Fixed Broadband Speed in G7 Countries

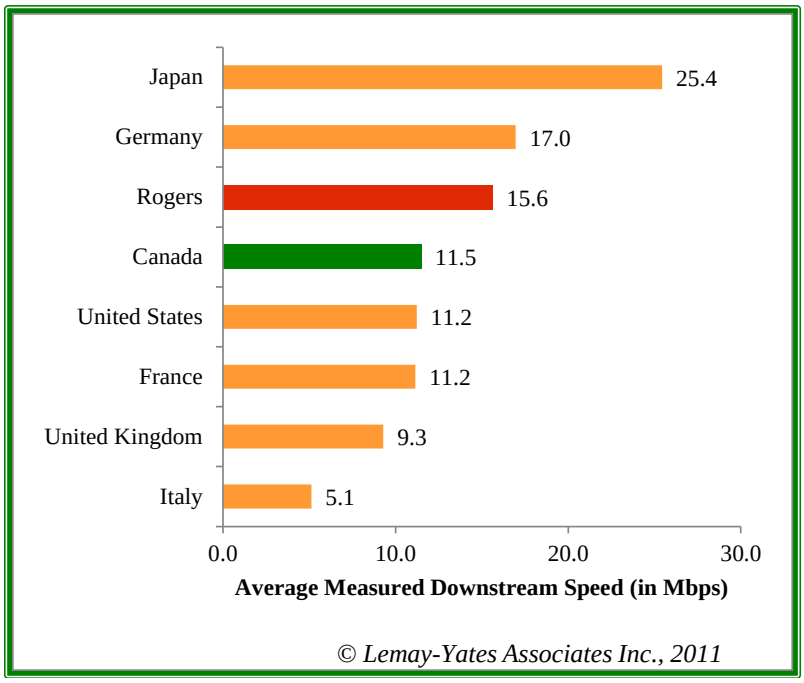


Figure 12 – 24-Hour Average Measured Fixed Broadband Speed in OECD Countries

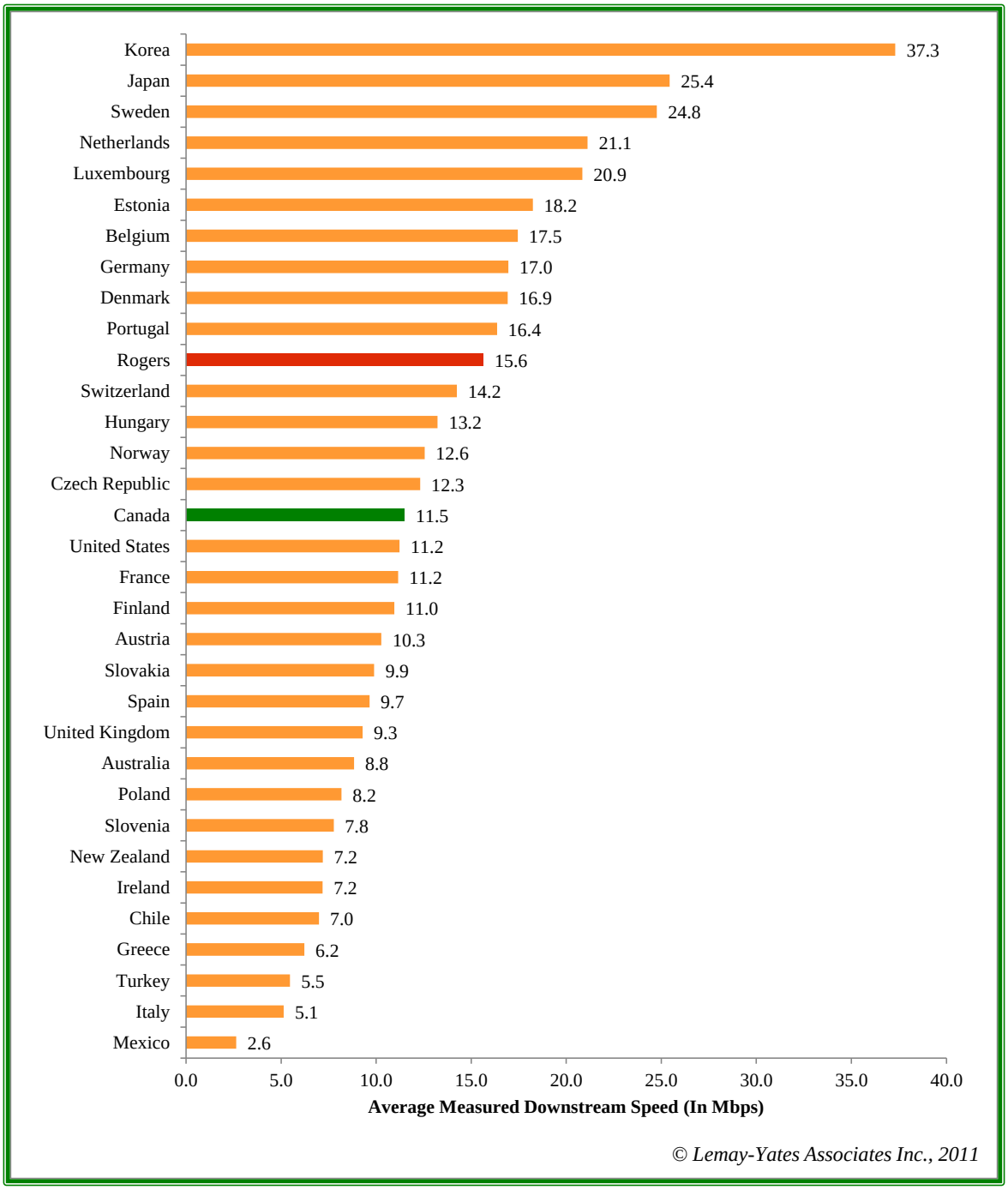


Figure 13 – 24-Hour Average Measured Fixed Broadband Speed of Major Canadians ISPs

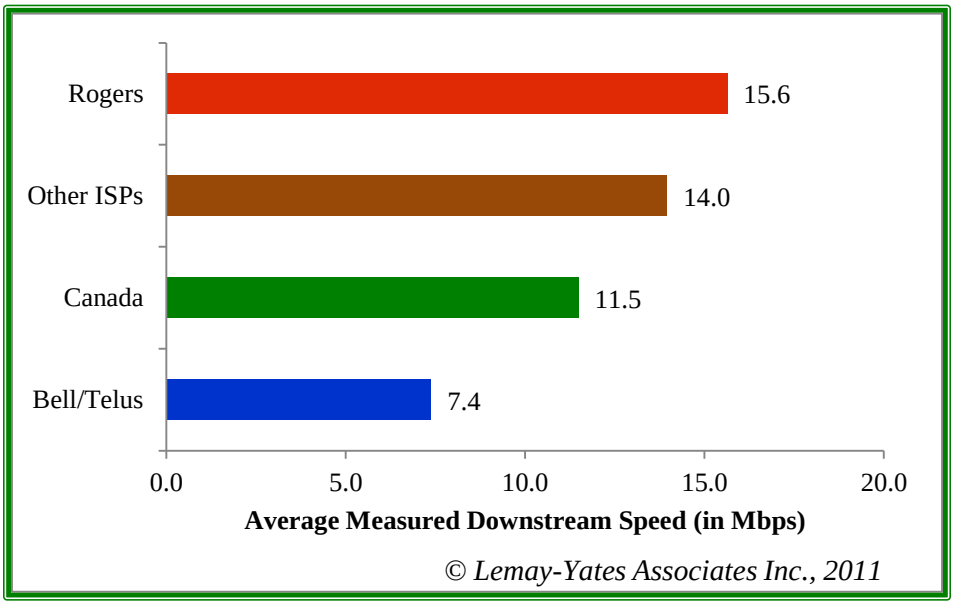
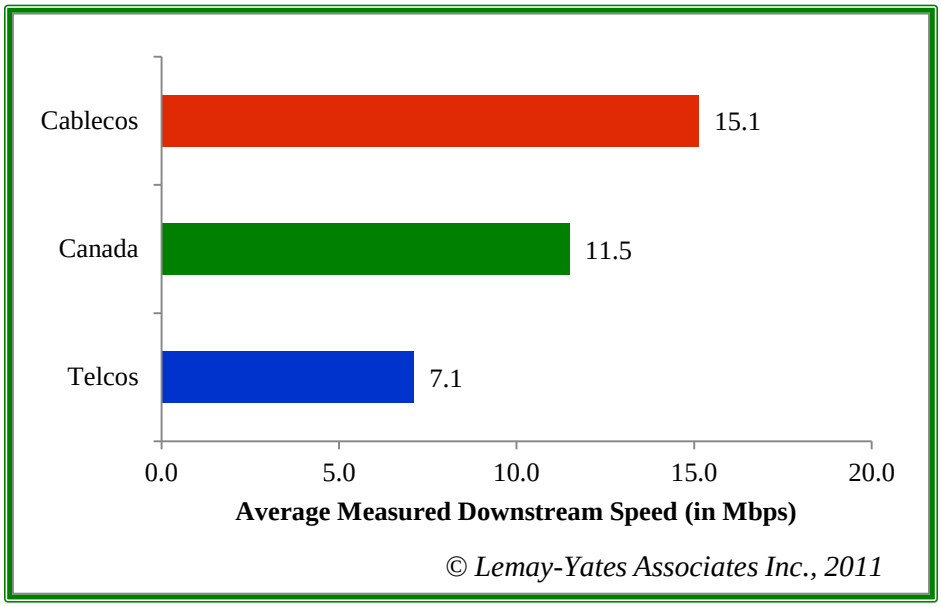


Figure 14 – 24-Hour Average Measured Fixed Broadband Speeds of Canadian Cablecos and Telcos



3.2 Benchmarking the Peak Hours Average Measured Fixed Broadband Speed

LYA has also compared the impact of increased usage on the broadband speed available to end-users during peak usage hours (assumed to be in the evenings between 6 pm and 11 pm based on typical Internet traffic profiles). This is the time of day when broadband networks are being used heavily and are under the most strain. For each country, the number of end-user speed tests conducted during these peak hours represented from close to 30% to more than 35% of all data points from that country.

Users in all countries experience a decrease in Peak Hours Average Measured Fixed Broadband speed, ranging from slightly less than 1% to a maximum of 22%, when compared to the 24-hour average. The average decrease among 32 OECD countries is 6.6%.

In terms of ranking, Canada remains at the same position in terms of measured downstream speed at peak hours, when compared to both G7 and OECD group of countries, at 3rd out of 7 and 15th out of 32, compared to the 24-hour average.

When considering percentage of decrease, Canada ranks 16th among all OECD countries, with a 5.8% decrease from overall download speeds to peak hours download speeds.

However, Rogers speed test results exhibited a lower percentage decrease when comparing Average 24-Hour Measured Broadband Speeds to Peak Hours Average Measured Broadband Speed versus the Canadian average, with only a 4.6% decrease. This represents a 20% improvement over the Canadian average. Rogers' performance is followed closely by the combined performance of Bell/TELUS with a combined average decrease of 4.8% while other Canadian ISPs see a 7.1% decrease from average to peak hours speeds.

When comparing peak hours average measured fixed broadband speeds among major Canadian ISPs, main cablecos drop from an average downstream speed of 15.1 Mbps to 14.2 Mbps and main telcos drop from 7.1 Mbps to 6.7 Mbps.

Details of the data used and of the LYA analyses are highlighted in the following Table and Figures for G7 and 32 OECD countries as well as among telcos and cablecos in Canada.

Table 2 – Geographic Distribution of Speedtest Data from OECD Countries for Peak Hours Analysis

Country	Total Peak Hours Data Points	% of Total Peak Hours Data Points	Proportion of Country Data Points
Australia	815,179	4.5%	36.8%
Austria	127,634	0.7%	35.4%
Belgium	147,323	0.8%	33.5%
Canada	785,833	4.4%	32.2%
Chile	275,152	1.5%	34.0%
Czech Republic	164,025	0.9%	34.2%
Denmark	77,623	0.4%	33.7%
Estonia	34,182	0.2%	32.4%
Finland	364,371	2.0%	36.6%
France	246,578	1.4%	34.3%
Germany	348,533	1.9%	35.1%
Greece	228,036	1.3%	33.5%
Hungary	498,061	2.8%	33.9%
Ireland	183,443	1.0%	37.1%
Italy	1,015,272	5.7%	33.4%
Japan	110,042	0.6%	29.1%
Korea (Republic of)	39,548	0.2%	30.5%
Luxembourg	12,109	0.1%	30.1%
Mexico	707,736	3.9%	31.8%
Netherlands	362,656	2.0%	35.2%
New Zealand	89,398	0.5%	29.2%
Norway	136,269	0.8%	37.0%
Poland	556,438	3.1%	35.5%
Portugal	234,180	1.3%	36.2%
Slovakia	72,562	0.4%	35.5%
Slovenia	80,316	0.4%	34.3%
Spain	253,400	1.4%	33.5%
Sweden	53,766	0.3%	36.7%
Switzerland	100,176	0.6%	36.9%
Turkey	239,441	1.3%	32.3%
United Kingdom	2,175,637	12.1%	35.5%
United States	7,420,563	41.3%	34.7%
Total	**17,955,482**		

Number of data points used from May 1 to July 31, 2011, totalling 92 days worth of data

Figure 15 – Peak Hours Average Measured Fixed Broadband Speed in G7 Countries

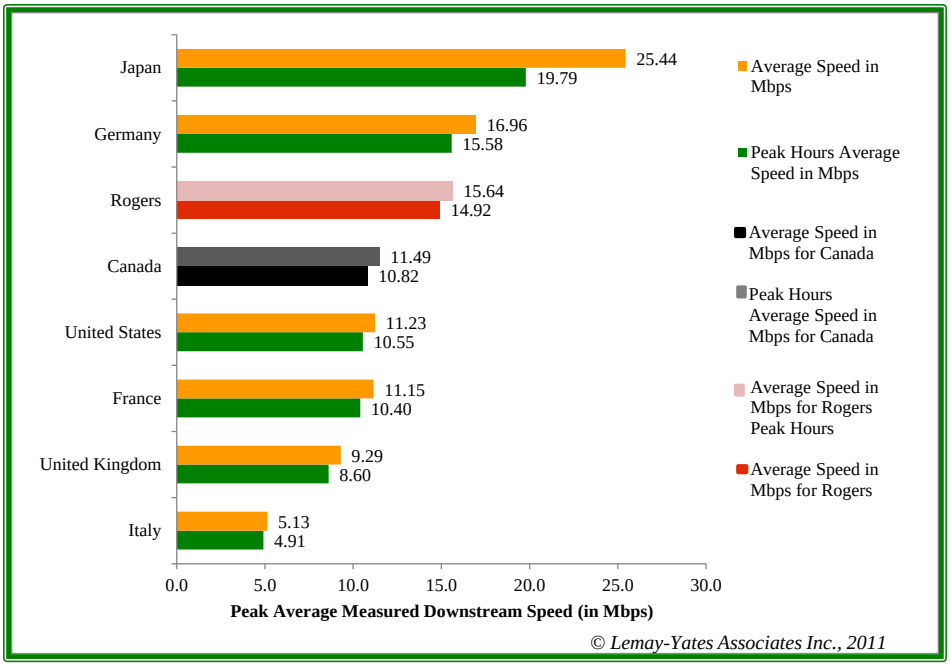


Figure 16 – Average Peak Hours Measured Fixed Broadband Speed in OECD Countries

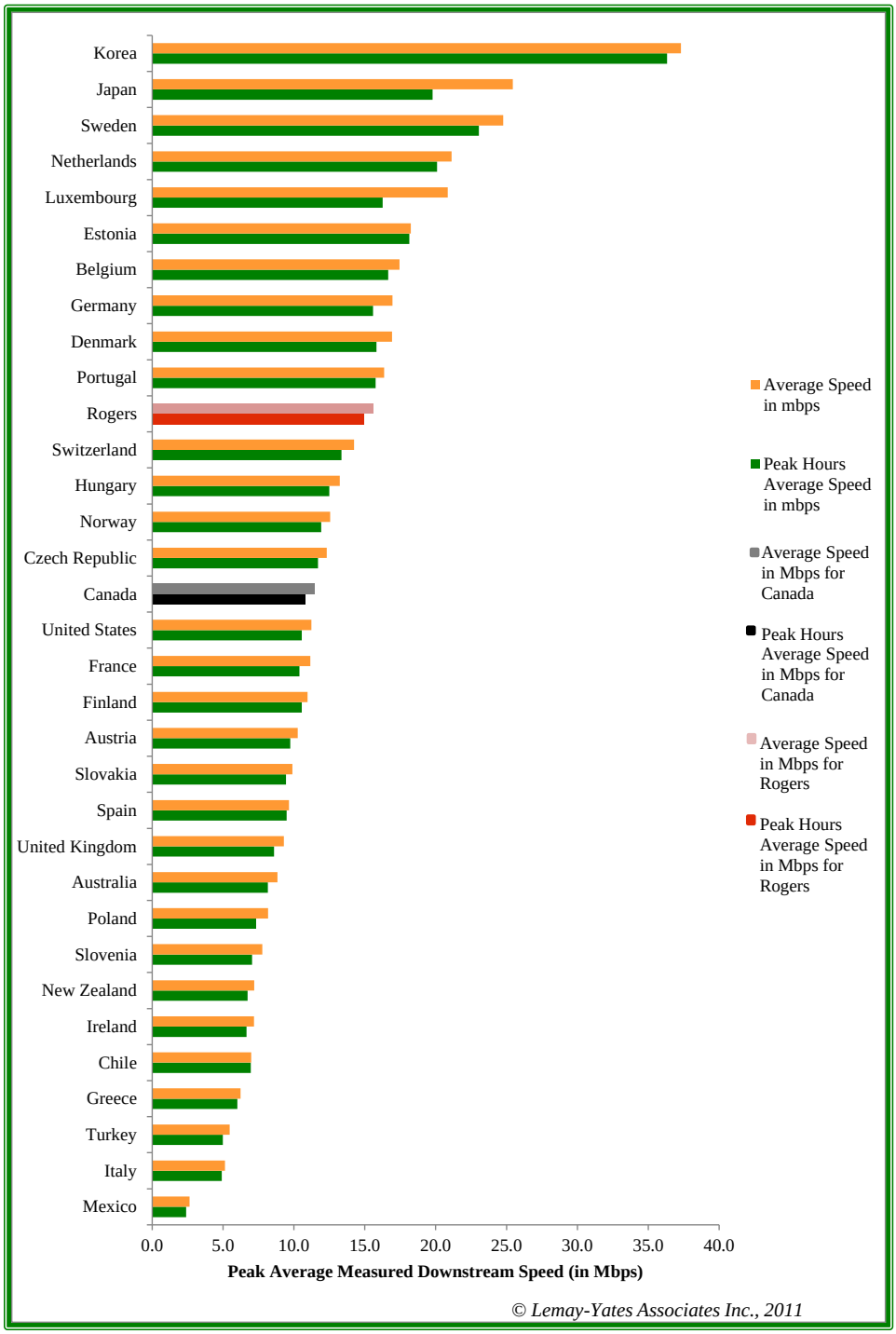
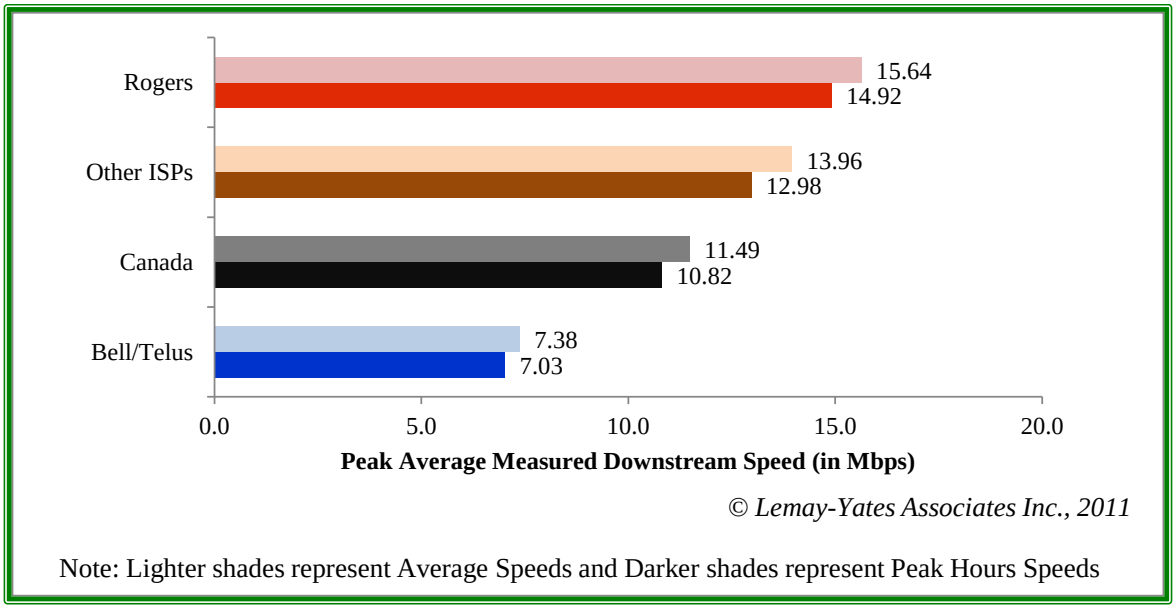
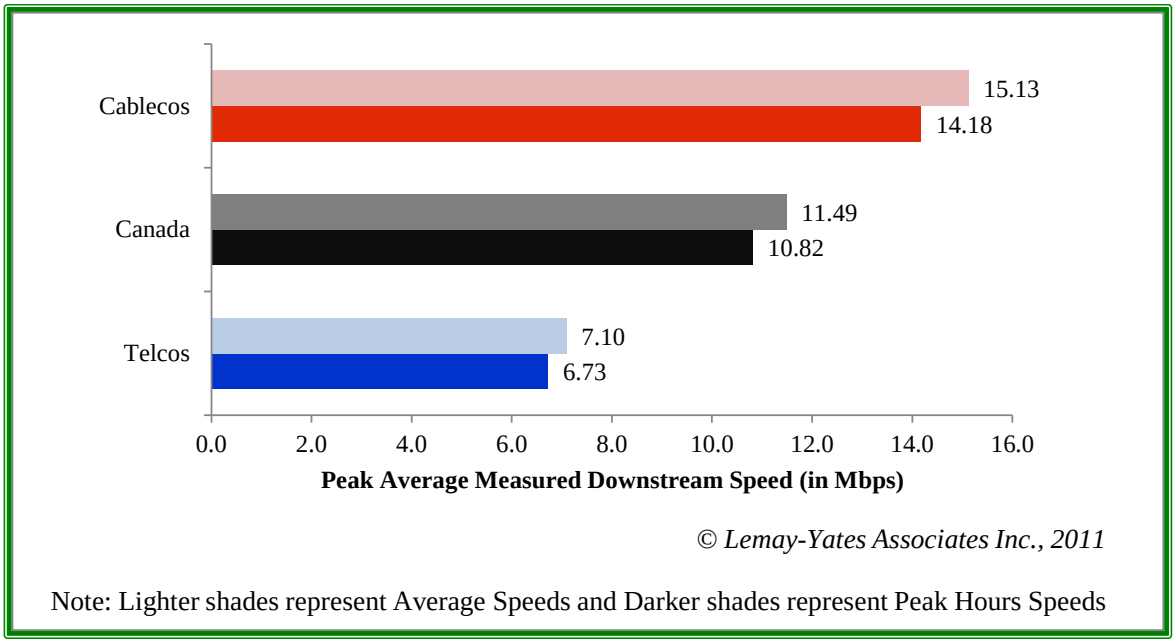


Figure 17 – Average Peak Hours Measured Fixed Broadband Speed comparing Major Canadian ISPs



Note: Lighter shades represent Average Speeds and Darker shades represent Peak Hours Speeds

Figure 18 – Average Peak Hours Measured Fixed Broadband Speed of Canadian Telcos and Cablecos



Note: Lighter shades represent Average Speeds and Darker shades represent Peak Hours Speeds

Figure 19 – Percent Decrease from 24-Hour Average Measured Broadband Speed to Peak Hours Average Measured Broadband Speed in G7 Countries

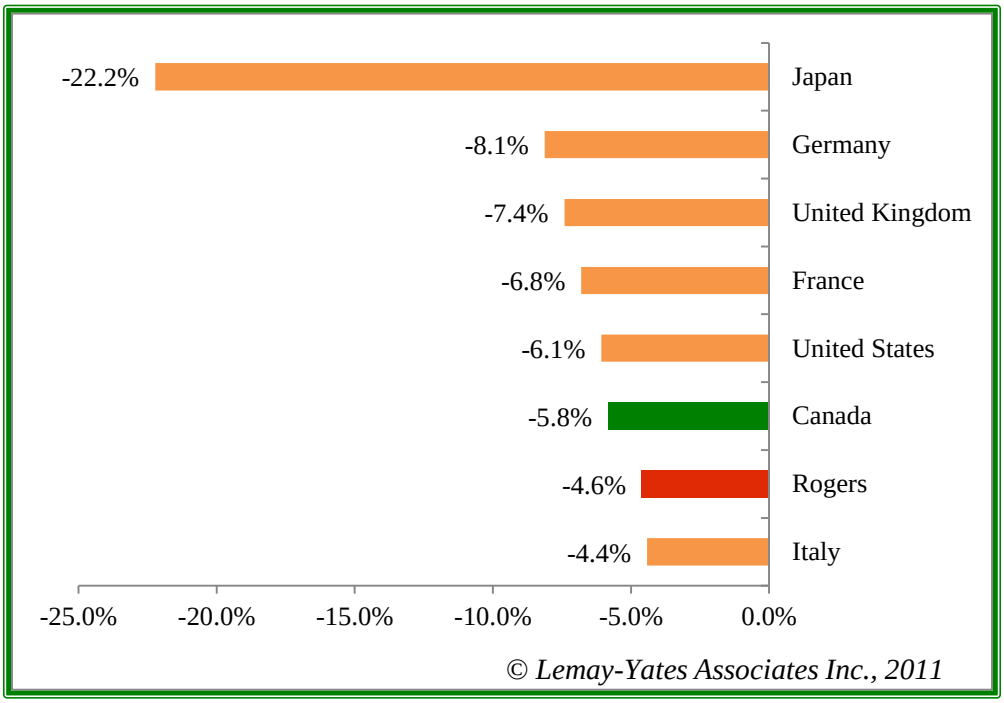


Figure 20 – Percent Decrease from 24-hour Average Measured Broadband Speed to Peak Hours Average Measured Broadband Speed comparing Major Canadian ISPs

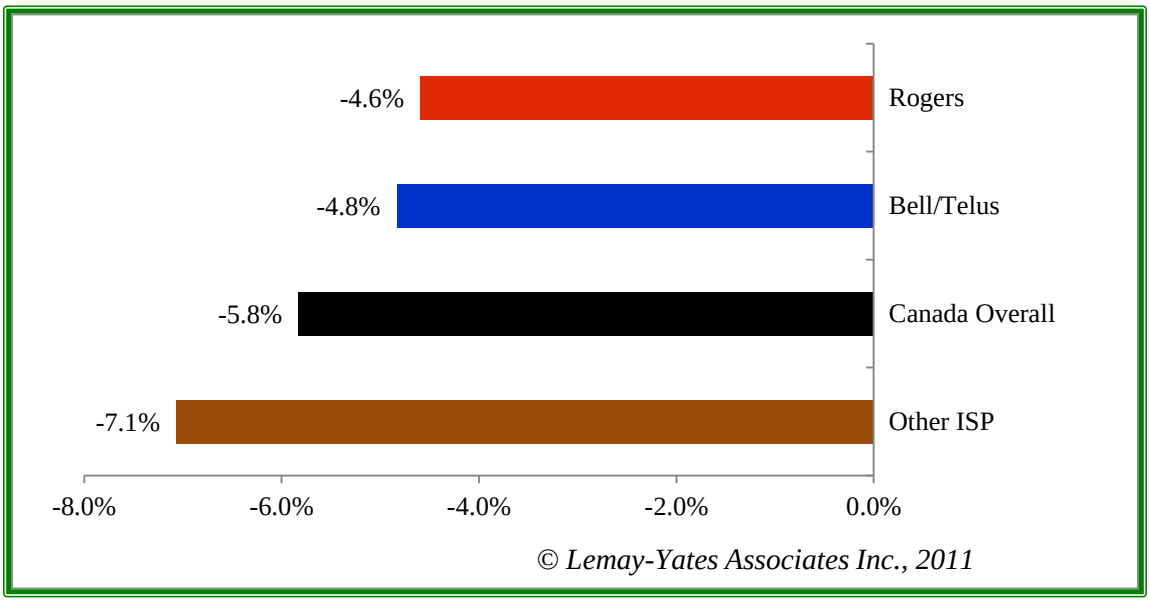
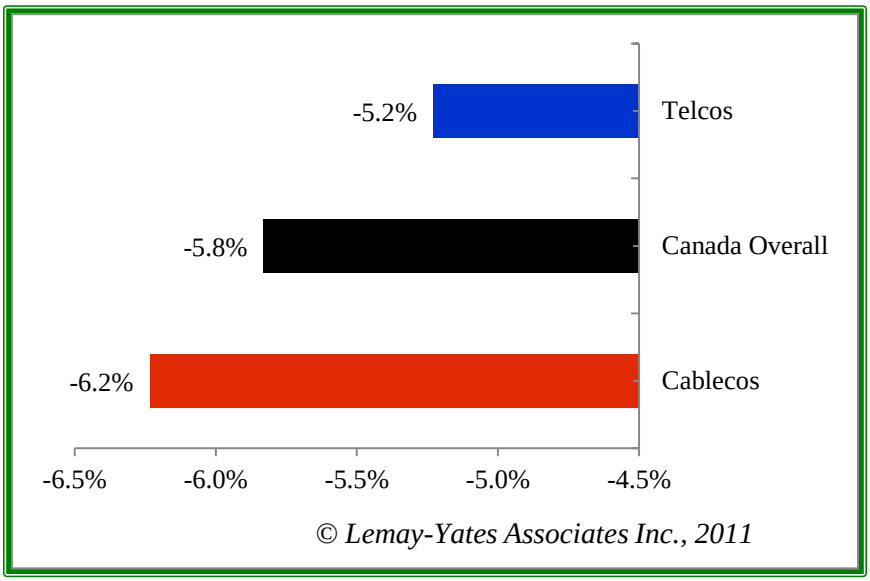


Figure 21 – Percent Decrease from 24-hour Average Measured Broadband Speed to Peak Hours Average Measured Broadband Speed for Canadian Telcos and Cablecos



4. Household Broadband Benefit Index

The Household Broadband Benefit Index aggregates two separate indicators to assess the benefits of broadband Internet in a given country to measure the real benefits of Internet to a country – broadband speed and subscription rates – by multiplying household broadband penetration by the Average Measured Broadband yielding the Household Broadband Benefit Index, per average household in a given country.

According to this Index, Canada ranks 3rd among G7 countries and 12th among 32 OECD countries. Compared to the rankings of Average Measured Broadband Speed alone, Canada's position among G7 remains unchanged, but Canada increases three places within the group of 32 OECD countries since countries such as Portugal, Hungary and Czech Republic drop in rankings due to lower broadband penetration compared to Canada despite a higher overall Average Measured Broadband Speed.

Figure 22 – Household Broadband Benefit Index in G7 Countries

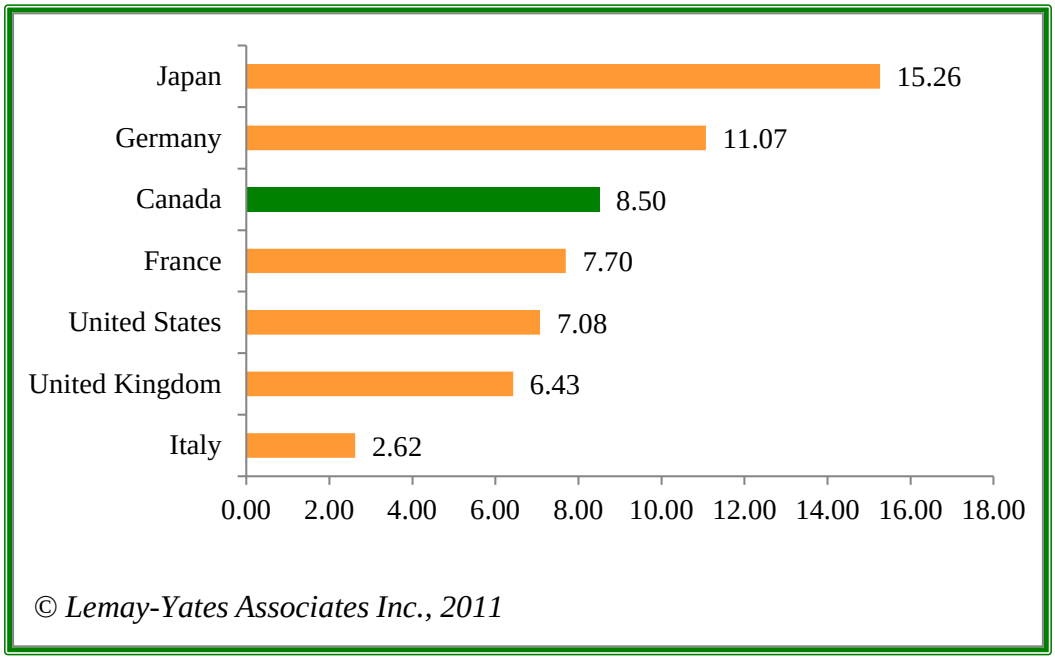
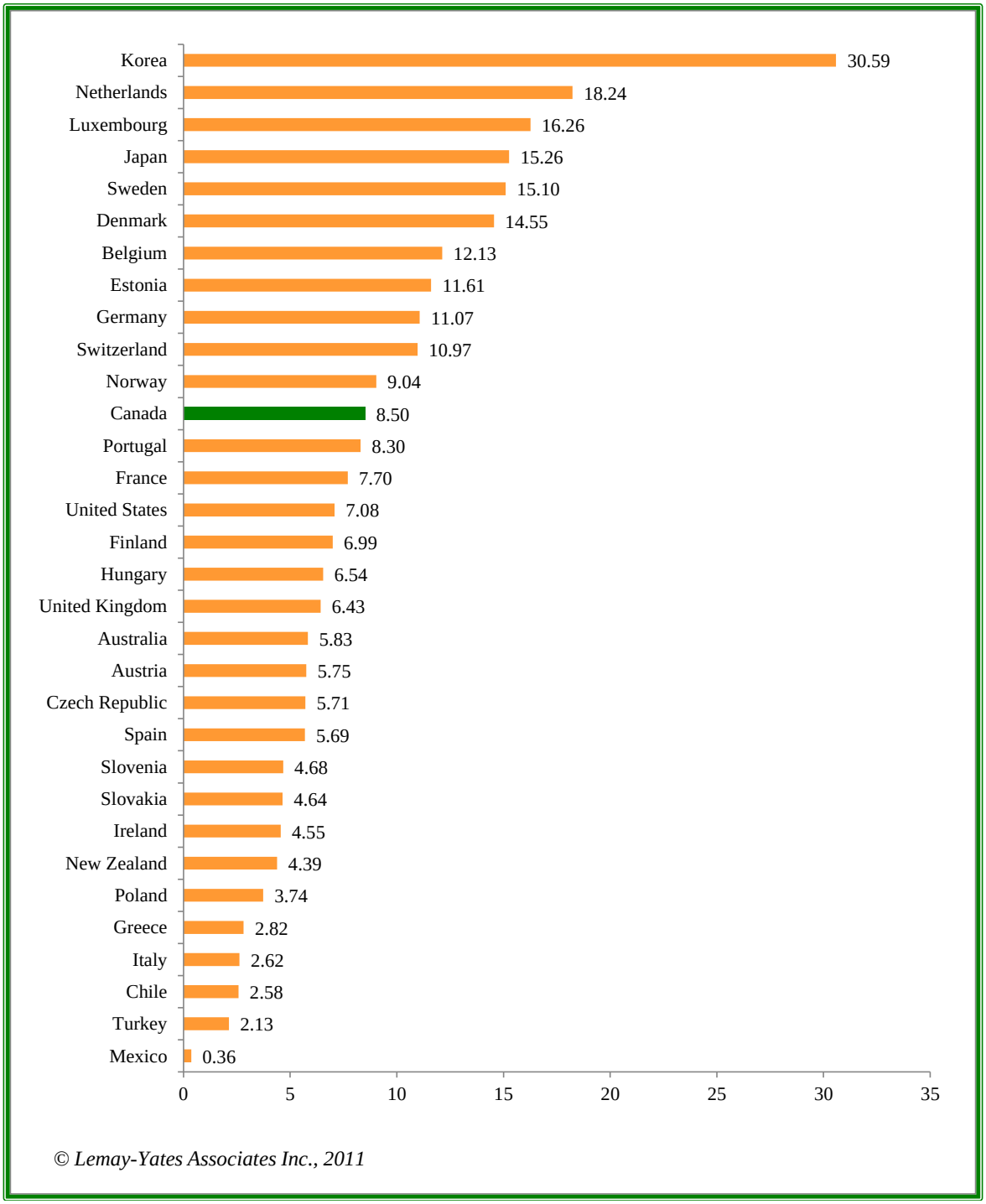


Figure 23 – Household Broadband Benefit Index in OECD countries



The Household Broadband Benefit Index intrinsically reflects both the availability as well as the relative affordability of broadband service in a given country, as lower subscription rates should normally follow high relative subscription prices, excluding the impact of any direct subsidies to consumers.

We also highlight the results of an analysis conducted by LYA in 2010 assessing the availability of high speed and very high speed broadband across a number of countries.[16] This Report highlighted that in mid-2010, 66% of Canadian households had access to very high-speed broadband services with peak downstream speeds in excess of 25 Mbps.

[16] The Performance of Canada's Consumer Broadband Networks in 2010, prepared for Rogers Communications Inc., July 2010 available at http://www.lya.com/en/spotlight/public_reports.php.

5. Benchmarking the Average Cost of a Megabit per Second of Real Broadband Speed

In this section, the average monthly subscription costs for broadband Internet services are first examined, based on LYA's detailed pricing research. In order to compare pricing from each country, the OECD's PPP Actual Individual Consumption rate in 2010 for conversion to US dollars was applied to all pricing comparative analyses.[17]

Then, the Average Cost of a Megabit per Second of broadband speed is calculated for each country, taking into account both the average monthly cost for service paid by the end user, which is then divided by the measured download speeds to assess the real cost of a Megabit per second of fixed downstream speed for each country for consumers.

Lastly, average monthly subscription cost is further divided into pricing for fixed broadband services with advertised downstream speeds above and below 10 Mbps, to determine the relative country rankings for higher and lower speed broadband internet.

5.1 The Average Monthly Broadband Subscription Cost

Overall, the range of average monthly subscription costs for fixed broadband Internet ranges from $24.23 to $55.99 in OECD countries, and $29.80 to $35.19 in G7 countries. Canada fares well relative to its international peers. Canada's average monthly subscription cost for fixed broadband service is $30.79, ranking 2nd among G7 countries, with only Italy possessing lower average monthly pricing.

[17] "Purchasing Power Parities (PPP) for Actual Individual Consumption covers all household consumption expenditure and that part of government final expenditure which covers services it supplies to individual households, for example housing, health, education, social protection etc. ... (in other words, it does not include government final expenditure on those services it supplies to households collectively such as defense, police, environment protection)", as sourced from OECD's Statistics Directorate, Price and Purchasing Parities (PPP), Frequently Asked Questions (FAQs). PPP Actual Individual Consumption rates were used in this Report since PPP for GDP covers expenditures for both households and government, whereas PPP for Actual Individual Consumption covers only expenditures relating to households, which should be more applicable to residential broadband monthly subscription prices.

On the same basis, Canada ranks 7th among 32 OECD countries. These rankings contrast drastically to the recently published OECD Communications Outlook 2011, where Canada is ranked 26th among 34 countries in terms of broadband pricing for monthly subscription with line charge.[18] In our view, this difference is mainly due to the fact that the OECD data uses a simple average across a vast range of service offerings in each country.[19] The OECD methodology does not reflect the market share of individual ISPs nor of the proportion of broadband below and above 10 Mbps, in each country, which LYA uses in its approach and which we believe provides a much closer estimate of the costs incurred by the average subscriber in each country.

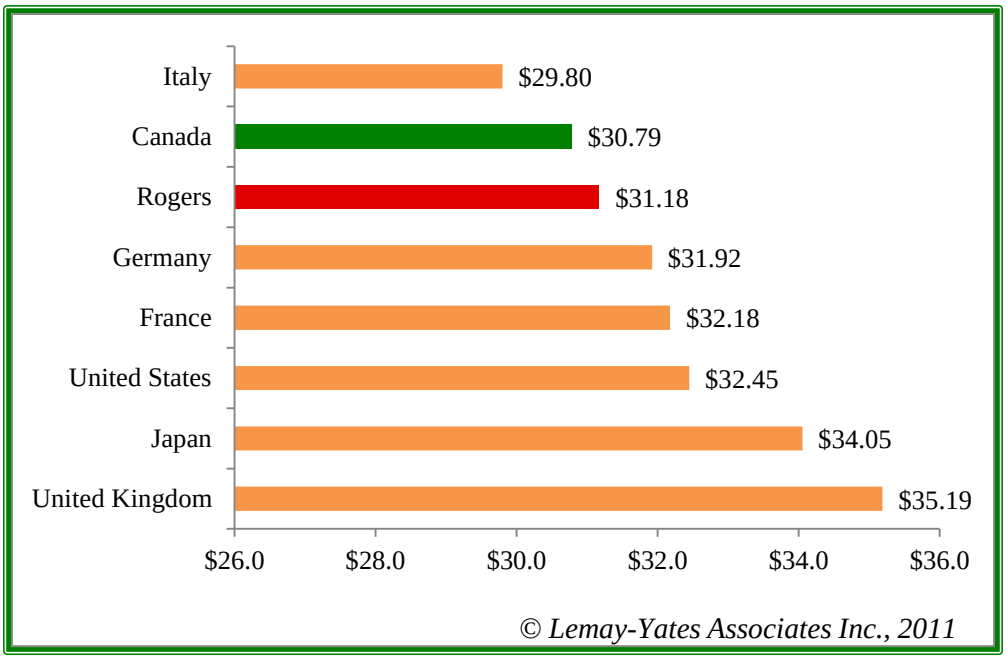
Rogers' overall monthly subscription price is slightly higher than the Canadian average, at $31.18 per month.[20] The following figure highlights the average monthly subscription cost in the G7 countries.

[18] See Figure 7.21 of 2011 OECD Communications Outlook Report, *op. cit.*

[19] See OECD Communications Outlook 2011 Report, Table 7.19, p. 295 and Statlink reference. In addition, the OECD has compiled pricing from 2-3 ISPs per country, where LYA uses pricing from all major ISPs, with an average of close to 5 ISPs per country.

[20] Rogers' results is slightly below Canada and can be explained by the fact that Rogers offers few broadband service plans below 10 Mbps, thus moving the Rogers average monthly cost slightly higher than the Canadian average.

Figure 24 – Average Monthly Subscription Cost (G7 Countries - $US PPP)



5.2 The Average Cost of a Megabit per Second of Broadband Speed

The Average Cost of a Megabit per Second of Broadband Speed to consumers in each country is provided in the following Figure for G7 countries. This cost is derived by dividing the average monthly subscription cost collected for all major ISPs in each country – expressed in US Dollar PPP – by the Average Measured Fixed Broadband Speed, reflecting the real performance of fixed broadband services in any country.

Canada's real Cost of a Megabit per Second of Fixed Broadband Speed is $2.68, while the total range among G7 countries varies from $1.34 to $5.81.

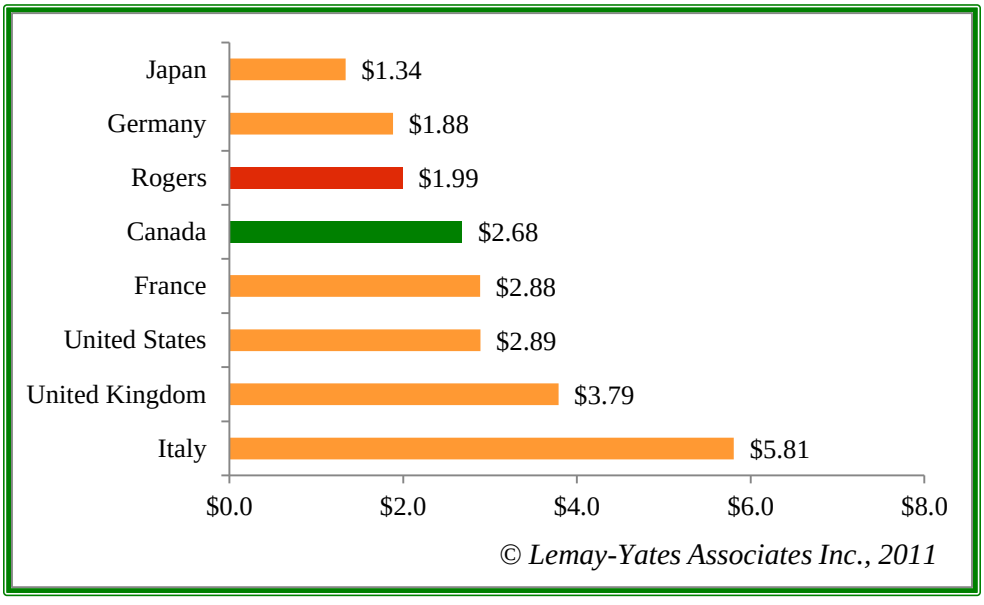
On the other hand, the range among OECD countries is from $0.87 to $17.42, a much wider than that observed for G7 countries, mainly due to Mexico scoring a Cost of a Mbps of Broadband Speed of $17.42.

Canada's ranking in terms of the Cost of a Megabit of Broadband Speed is 3rd among G7 countries after Japan and Germany, and 12th among 32 OECD countries.

In the OECD's Communications Outlook 2011 report, a similar metric ranks Canada at the 25th position among 34 OECD countries.[21] The reasons for the difference in rankings between the LYA and the OECD data are the same as those listed in Section 5.1 in addition to the fact that the LYA methodology is based on actual average measured speeds while OECD uses an average of advertised downstream speeds.

The Cost of a Megabit of Broadband Speed for subscribers to Rogers Communications fixed broadband services is $1.99, close to 25% lower than the Canadian average, reflecting the higher measured broadband speeds of Rogers' customers.

Figure 25 – Average Monthly Cost of a Megabit per Second of Broadband Speed in G7 Countries ($US PPP)



[21] See Figure 7.23 of 2011 OECD Communications Outlook Report, *op. cit.*

5.3 The Average Monthly Subscription Cost for Advertised Fixed Broadband Speeds below 10 Mbps

As part of the methodology to derive the Average Monthly Broadband Subscription Cost for each country, LYA assessed the average cost to end users for entry-level fixed broadband Internet services with advertised speeds below 10 Mbps, taking into account the relative market share of each of the most significant ISPs in each country.[22]

Canada ranks second among G7 countries on this metric with an average monthly cost of $28.42, and eleventh among 31 OECD countries, as shown on the following two Figures. Note that South Korea is not included in this comparison, as close to all broadband Internet plans reviewed had advertised broadband speeds in excess of 10 Mbps. An indicator in the OECD Communications Outlook Report calculating the average monthly subscription for broadband speeds ranging from 2.5 to 15 Mbps ranks Canada at position number 25 out of 33 countries.[23]

For Rogers Communications, the average monthly cost for advertised broadband speeds below 10 Mbps is $24.06, lower than the Canadian average.[24]

[22] Distinguishing connection speeds based on being below vs. above 10 Mbps is often used by reporting agencies in assessing broadband performance. It should be kept in mind that pricing plans vary considerably from one country to another and do not typically "break" at 10 Mbps. Most ISPs offer many pricing packages, each with a qualifier "up to" speed. For this Report, for each country, a low, medium and high plan was chosen for each major ISP – "low" being for the lowest speed offered, "high" for the highest speed offered to consumers and "medium" for the median speed among all plans. In some cases the "medium" plan was for speeds lower than 10 Mbps and so was included in calculating the average <10 Mbps. In other cases, the medium plan provides for more than 10 Mbps and in those cases it was included for the >10 Mbps analysis.

[23] See Figure 7.25 of 2011 OECD Communications Outlook Report, *op.cit.*

[24] However, we note that Rogers currently offers only two Internet plans with downstream plans below 10 Mbps, with one at up to 500 kbps and the other at up to 3 Mbps, while other Canadian ISPs tend to offer a plan in the 6 to 8 Mbps range, which has been included in these averages.

Figure 26 – Average Monthly Cost for Broadband Services with Advertised Speeds below 10 Mbps in G7 Countries ($US PPP)

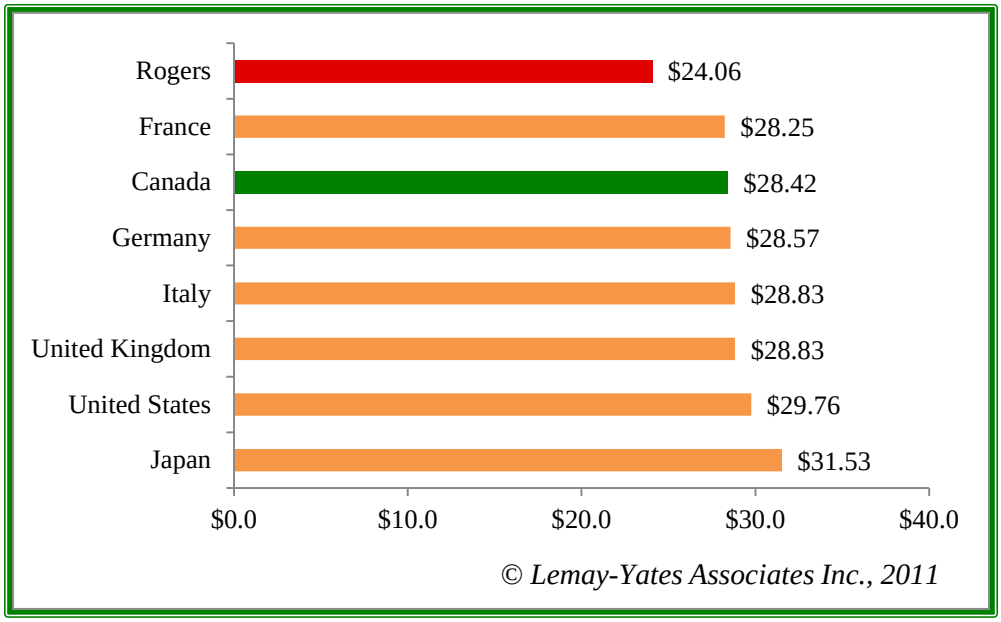
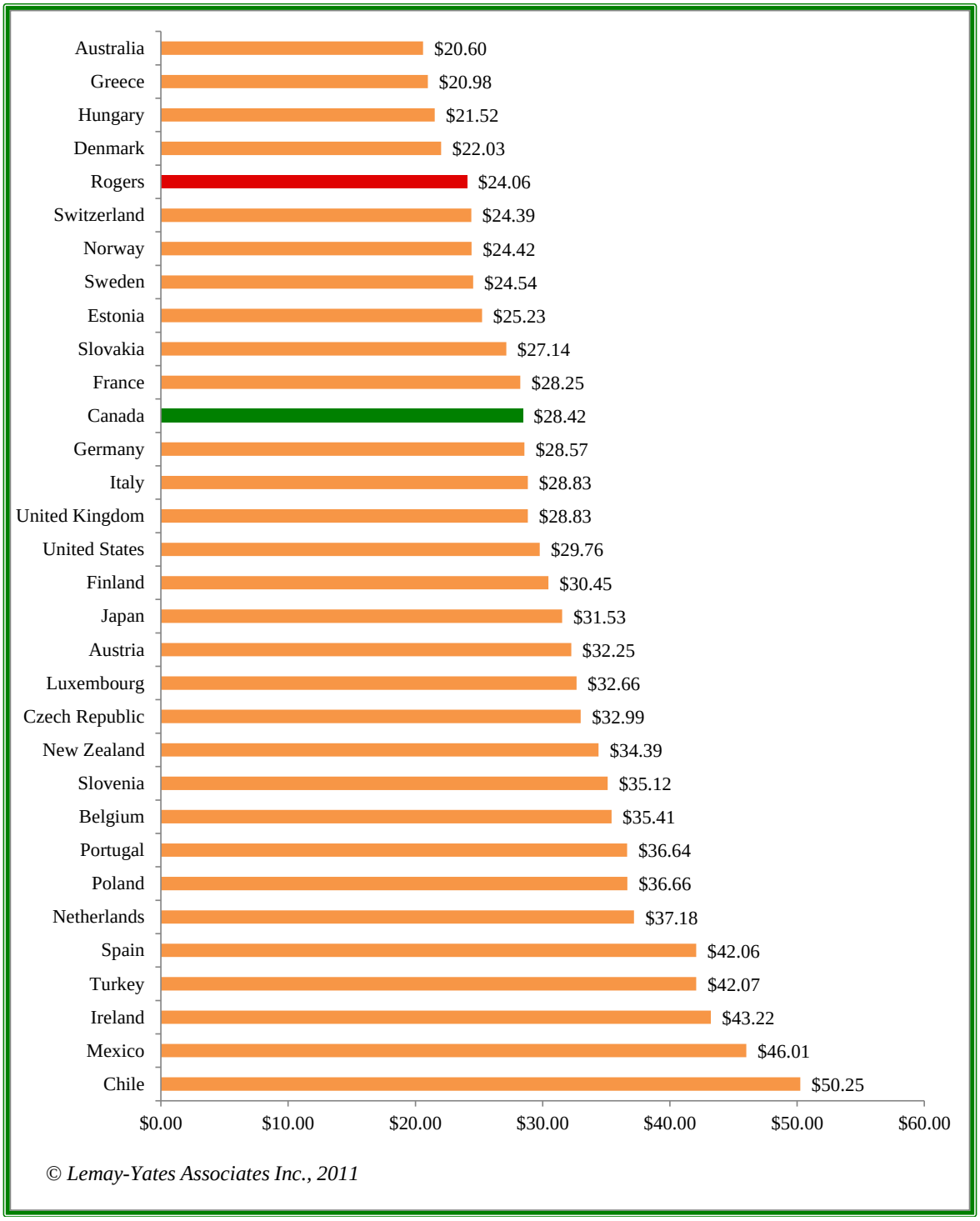


Figure 27 – Average Monthly Cost for Advertised Broadband Speeds below 10 Mbps in OECD Countries ($US PPP)

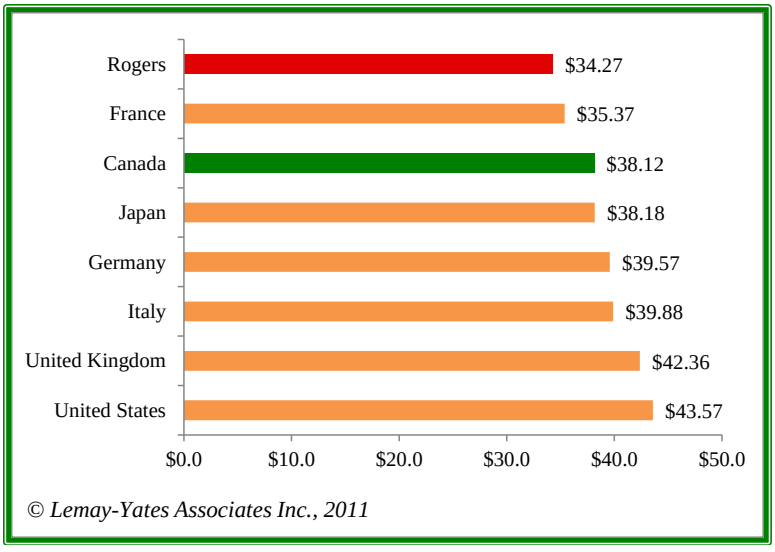


5.4 The Average Monthly Subscription Cost for Advertised Broadband Speeds above 10 Mbps

In the case of broadband Internet access service with advertised speeds above 10 Mbps, the average monthly comes in Canada is $38.12, ranking second among G7 countries and sixth among 31 OECD countries. Mexico has not been included in the analysis of OECD countries, since close to all broadband Internet offerings reviewed for this analysis were offered with speeds of only up to 10 Mbps.

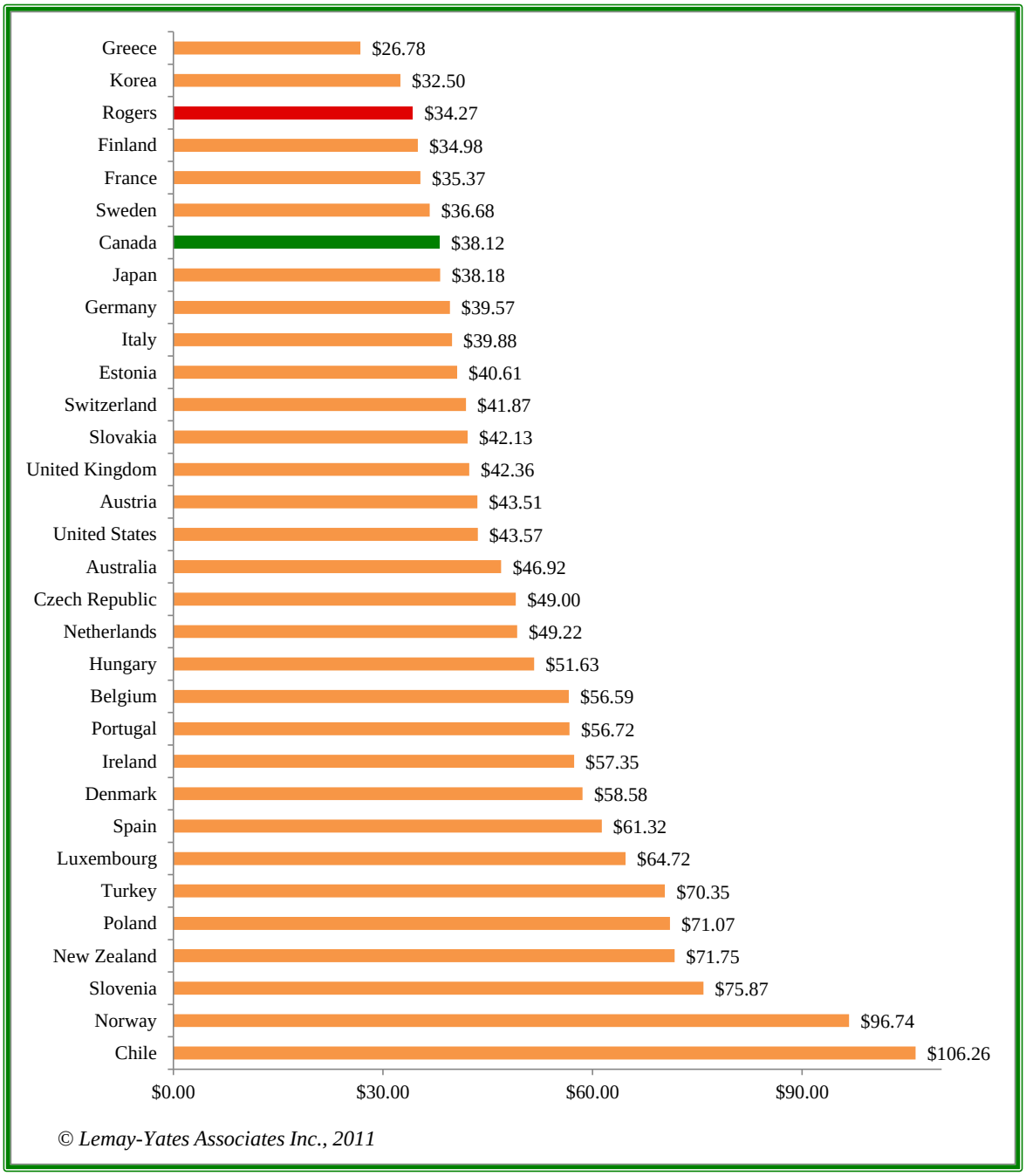
A similar indicator in the OECD 2011 Communications Outlook Report ranks Canada at 26th among 33 OECD countries, calculating the average monthly subscription for broadband speeds ranging from 15 to 30 Mbps.[25] In the case of subscribers to the fixed broadband services of Rogers Communications with advertised speeds above 10 Mbps, the monthly cost has been estimated at $34.27, 10% lower than the Canadian average, scoring an impressive first place among G7 countries and third place among 31 OECD countries.

Figure 28 – Average Monthly Cost for Broadband Services with Advertised Speeds above 10 Mbps in G7 Countries ($US PPP)



[25] See Figure 7.26 of OECD Communications Outlook Report 2011, *op.cit.*

Figure 29 – Average Monthly Cost for Broadband Services with Advertised Speeds > 10 Mbps in OECD countries ($US PPP)



6. Notes on Methodology

The key hypothesis underlying LYA's approach, which was validated by analysis of user conducted speed tests, is that the raw data of end-user speed tests does not reflect the actual market share of the various service providers; for example some Internet Service providers may cover only a small geographic portion of the country, or subscribers to providers of very high-speed broadband Internet access services may have a stronger propensity to test the actual speed delivered by their service provider, or vice versa.

Thus, an analysis of all end-user speed tests conducted in a given country, calculating the weighted average broadband Internet speed based on the market share of the various broadband Internet service providers, as done herein, provides a better perspective on the average broadband Internet speed as experienced by the average user in each country, or the Average Measured Fixed Broadband Speed per country.

The Average Measured Fixed Broadband Speed metric was multiplied by the penetration of broadband among households in each country to yield the Household Broadband Benefit Index, intrinsically reflecting both availability and affordability of fixed broadband Internet service in each country.

The Average Cost of a Mbps – expressed in US dollars on a Purchasing Power Parity (PPP) basis to facilitate comparison of many countries – for fixed Internet service for each country, was calculated based on the average end-user cost of broadband service in a given country divided by the Average Measured Fixed Broadband Speed for that country.[26]

[26] For all major Internet Service Providers (ISPs) in each of the 32 countries surveyed, three price points were researched for each provider's fixed, high-speed broadband Internet offerings, at the lowest, mid-range and highest of available plans. Their respective advertised speeds and monthly data cap, if applicable, were researched as well. In order to account for differences between OECD countries in terms of broadband plan offerings, prices are assumed to be on a two-year contract basis, including promotional pricing for applicable months. As well, 50% of the total additional line charge was added to listed monthly

It thus reflects the real cost of a megabit per second of broadband speed as paid by consumers in each country.

The analyses developed herein are based on five key sets of data:

A. More than 52 million end-user speed tests conducted by the users themselves on www.speedtest.com during the months of May, June and July 2011, thus covering 92 days in total.[27] The analysis for peak hours usage reflects more than 17 million end-user tests.
B. Research on the market share of the various Internet Service Providers in each of the 32 countries included in this analysis,[28]
C. Research on the penetration of broadband Internet per household for each country,
D. Research on the proportion of households with broadband Internet access services below and above downstream speeds of 10 Mbps,[29] and
E. Research on pricing for different broadband services offered by Internet service providers in each of the 32 countries covered. LYA researched broadband prices as offered by 155 service providers across the 32 OECD countries included in this Report with an average of 5 service providers per country. For these service providers, a total of 505 price plans were assessed, yielding an average of close to

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subscription prices, only where applicable. The average end-user cost of broadband service in each country was calculated reflecting the services offerings of the service providers coupled with the market share of each service provider as well as the proportion of end users subscribing to broadband services with advertised speeds below and above 10 Mbps, to properly reflect, to the extent possible, the composition of the broadband subscriber base.

[27] LYA acquired and analyzed the raw data of user-conducted speed tests from Ookla, the organization behind the www.speedtest.com web site.

[28] The market share for various ISPs collected total at least 80% of the broadband market in each country, as measured by number of subscribers.

[29] LYA used the split of subscribers to fixed broadband Internet access services in each country to derive the average monthly cost of Internet access services based on the service offers of the various service providers. For example, if 20% of households in a given country subscribe to services of 10 Mbps or higher, then a relative weight of 20% was given to the prices for service plans above 10 Mbps in that country. The statistic of the proportion of broadband subscribers to service plans below and above 10 Mbps was available for all countries considered in this Report. For the US and Canada, more detailed information regarding the split of subscribers according to downstream speed was available from the regulators and was used our analyses.

16 price plans per country that were included in our analysis. The pricing research was conducted from August to October 2011 and reflects pricing for that period for each service provider.[30]

[30] The pricing for all major ISPs with known market share information was collected. For each ISP surveyed, the objective was to include at least three price points related to the monthly cost of the service in the analysis – the lowest, the mid-point and the highest, as to represent the full range of prices offered by all ISPs. Discounts on the monthly fee service (for example 50% off for the first 6 months) were included in the analyses which assessed the average monthly cost to the subscriber over a 2-year period.

7. Background – Lemay-Yates Associates Inc.

Development and implementation of business strategy has been at the heart of Lemay-Yates Associates Inc. (LYA®) services since 1993, providing us with a unique ability to integrate market, technical, network, economic, regulatory and investment analyses – helping address all the Strategic **C**'s – across the blurring lines of mobile-telecom-cable, as well as carriage-content, in a competitive environment that is increasingly dynamic, complex and risky.

LYA® is a key advisor to the telecom industry, helping to drive major investment decisions and strategy. LYA® also does independent strategic research and has published a number of reports on telecom markets with topics covering Local Competition, CLECs, Foreign Investment, Mobile 911, Consumer Telecom, Mobile Broadband Services and others.

c-Ahead®, ***c***-Sharp, ***c***-Change, ***c***-Results
*LYA®'s Strategic "**C**" Research Program*

Our research, experience and capabilities are resources for you to see ahead, see clearly, see changes and get results to support addressing all the ***c***'s of business strategy…

LYA® focuses on providing timely, accurate and actionable insight about your ***c***ustomers and ***c***ompetitors via ***c***-Ahead® Research Reports and ***c***-Sharp database products. Our ***c***-Sharp databases of business information let you focus clearly on the quantitative to help build competitive advantage by providing business intelligence and insight.

In the fast-moving age of instant information, strategic research is essential to be able to see ahead especially when the future is closer than you may think and possibly bigger than it appears. We address this with quantifiable, reliable research integrated with our strategic insight and forward looking approach for your product and service planning.

In concert with our research, our strategy consulting services support the other Strategic **C**'s – assessment of the ***c***apabilities required to implement strategy and evaluation of the ***c***ost of investing to do so. You will ***c***-Change and ***c***-Results. ***c***-Change means consulting services to help see change coming and to support making a ***c***-change in your business. LYA® helps you move to the next level… you will ***c***-Results from us and from the implementation of your new plans, products and services.

Please visit our web site: **www.LYA.com.**