

2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions

March 22, 2016

Prepared for:
The Canadian Radio-television and Telecommunications Commission (CRTC)

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NOTE: The views expressed in this Study are solely those of Nordicity Group Limited and do not necessarily represent views of the Canadian Radio-television and Telecommunications Commission

ISSN: 2371-4212
Cat. No.: BC9-24E-PDF

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Overview

This Study, commissioned by the Canadian Radio-television and Telecommunications Commission (CRTC) and prepared by Nordicity Group Limited, is the 9th (2016) edition of the annual telecommunications services price comparison Study. The purpose of this Study is to provide a detailed comparative price analysis of telecommunications services in Canada vis-à-vis the US and six other countries.

Key Parameters

As in previous years, the telecommunications services examined in this Study were classified in five main categories. Individual service baskets were defined according to increasing levels of service usage and feature availability under each category. The total number of service baskets under each category was based on distinct levels of service usage, the availability of feature offerings, as well as their associated prices. Prices were measured for different pre-defined service baskets under each category.

Service baskets used for each category of telecommunications services are listed below:

- **Fixed Telephony¹:** *Level 1 to Level 3* – same as last year;
- **Mobile Wireless Telephony:** *Level 1 to Level 5* - same as last year. However, *Level 6* was added this year to capture family share plans, referred to as '*family basket*';
- **Fixed Broadband Internet:** *Level 1 to Level 4* - same as last year. However, *Level 1* and *Level 2* were re-defined (speeds increased) to reflect the current trends in available speed offerings;
- **Mobile Wireless Internet²:** *Level 1* and *Level 2* - same as last year. However, *Level 3* was also added to capture higher data usage; and
- **Bundled Services:** *Level 1 to Level 3* - same as last year.

As in the previous year's Study, country specific average prices in equivalent Canadian dollars were determined for the above service baskets, based on a survey of known service providers in principal cities of eight jurisdictions: Canada, the US and six other countries:

- 1) **Canada:** *Halifax (NS), Montreal (QC), Toronto (ON), Winnipeg (MB), Regina (SK) and Vancouver (BC)*
- 2) **United States of America (US):** *Boston (MA), Kansas City (MO), Minneapolis (MN), and Seattle (WA)*
- 3) **Australia:** *Sydney*; **United Kingdom (UK):** *London*; **France:** *Paris*; **Italy:** *Rome*; **Germany:** *Berlin* and **Japan:** *Tokyo*

Key Findings

This section summarizes Nordicity's key findings in each of the five categories of telecommunications services. For the purpose of comparing international price data, foreign currency prices were converted to Canadian dollars (CAD) using the Bank of Canada's monthly average exchange for the month of February 2016. The prices were further adjusted for the purchasing power parity (PPP) differences between countries using the OECD's PPP comparative price level indices for February, 2016.

- **Fixed Telephony:** In the Fixed Telephony category, out of a total of 8 countries, Canada ranked amongst the least expensive (i.e. ranked sixth) in pricing in the Level 1 service basket. Australia was ranked 1st – the most expensive country in Level 1. Canada's prices were 23.2% lower, relative to

¹ Fixed Telephony refers to Fixed Wireline Telephone.

² Mobile Wireless Internet refers to Mobile Wireless Broadband Internet.

Australia's prices, as indicated in the down arrow in the Table 1. Similarly, in the Level 2 and Level 3 service baskets, Canada also ranked amongst the least expensive (fifth from the highest) and its prices were 17.5% below those of Australia and 29.2% below those of Japan – the countries with the highest prices in Level 2 and Level 3, respectively.

Table 1: Fixed Telephony: International Price Comparison and Canada's Price Difference Relative to Foreign Jurisdictions

| Country | Service Basket Level | | | | | | | | |
|-------------------------------|----------------------------------|--------|---|------------------------------------|--------|---|------------------------------------|--------|---|
| | Level 1: 400 Minutes with 10% LD | | | Level 2: 1,000 Minutes with 20% LD | | | Level 3: 1,600 Minutes with 30% LD | | |
| Canada | \$ 39.52 | | ▼ | \$ 55.78 | | ▼ | \$ 60.32 | | ▼ |
| U.S.A. | \$ 42.03 | 6.0% | ↓ | \$ 58.46 | 4.6% | ↓ | \$ 77.05 | 21.7% | ↓ |
| Australia | \$ 51.43 | 23.2% | ↓ | \$ 67.59 | 17.5% | ↓ | \$ 72.23 | 16.5% | ↓ |
| U.K. | \$ 39.61 | 0.2% | ↓ | \$ 50.59 | -10.3% | ↑ | \$ 59.28 | -1.8% | ↑ |
| France | \$ 37.61 | -5.1% | ↑ | n/a | n/a | | \$ 57.41 | -5.1% | ↑ |
| Italy | \$ 42.40 | 6.8% | ↓ | \$ 45.81 | -21.8% | ↑ | \$ 54.01 | -11.7% | ↑ |
| Germany | \$ 42.93 | 7.9% | ↓ | \$ 64.49 | 13.5% | ↓ | \$ 77.11 | 21.8% | ↓ |
| Japan | \$ 34.91 | -13.2% | ↑ | \$ 57.46 | 2.9% | ↓ | \$ 85.17 | 29.2% | ↓ |
| Canada's Rank, (from Highest) | 6 | | | 5 | | | 5 | | |

- **Mobile Wireless Telephony:** In the Mobile Wireless Telephony category, Canada ranked the highest in pricing in the Level 1 service basket, third in the Level 2 service basket and second in the Level 3, 4, 5 and 6 service baskets.

Table 2: Mobile Wireless Telephony: International Price Comparison and Canada's Price Difference Relative to Foreign Jurisdictions

| Country | Service Basket Level | | | | | |
|-------------------------------|----------------------|-----------|----------------------------------|-----------|---|-----------|
| | Level 1: 150 Minutes | | Level 2: 450 Minutes and 300 SMS | | Level 3: 1,200 Minutes, 300 SMS and 1 GB Data | |
| Canada | \$ 41.08 | ▼ | \$ 48.77 | ▼ | \$ 74.67 | ▼ |
| U.S.A. | \$ 27.00 | -52.1% ↑ | \$ 51.64 | 5.6% ↓ | \$ 73.00 | -2.3% ↑ |
| Australia | \$ 28.19 | -45.8% ↑ | n/a | n/a | \$ 30.91 | -141.6% ↑ |
| U.K. | \$ 20.84 | -97.2% ↑ | \$ 25.79 | -89.1% ↑ | \$ 30.13 | -147.8% ↑ |
| France | \$ 22.49 | -82.7% ↑ | \$ 24.17 | -101.8% ↑ | \$ 38.08 | -96.1% ↑ |
| Italy | \$ 17.70 | -132.1% ↑ | \$ 24.41 | -99.8% ↑ | \$ 34.79 | -114.6% ↑ |
| Germany | \$ 17.15 | -139.6% ↑ | \$ 28.28 | -72.5% ↑ | \$ 56.20 | -32.9% ↑ |
| Japan | \$ 29.06 | -41.4% ↑ | \$ 48.78 | 0.0% ↓ | \$ 89.72 | 16.8% ↓ |
| Canada's Rank, (from Highest) | 1 | | 3 | | 2 | |

| Country | Service Basket Level | | | | | |
|-------------------------------|---|-----------|---|-----------|---|-----------|
| | Level 4: Unlimited Minutes, 300 SMS and 2 GB Data | | Level 5: Unlimited Minutes, SMS and 5 GB Data | | Level 6: Unlimited Minutes, SMS and 10 GB Data with 3 Lines | |
| Canada | \$ 81.05 | ▼ | \$ 96.55 | ▼ | \$ 231.99 | ▼ |
| U.S.A. | \$ 89.50 | 9.4% ↓ | \$ 117.33 | 17.7% ↓ | \$ 206.19 | -12.5% ↑ |
| Australia | \$ 44.78 | -81.0% ↑ | \$ 66.67 | -44.8% ↑ | \$ 198.50 | -16.9% ↑ |
| U.K. | \$ 35.55 | -128.0% ↑ | \$ 42.22 | -128.7% ↑ | \$ 99.31 | -133.6% ↑ |
| France | \$ 61.60 | -31.6% ↑ | \$ 70.12 | -37.7% ↑ | n/a | n/a |
| Italy | \$ 49.42 | -64.0% ↑ | \$ 61.02 | -58.2% ↑ | n/a | n/a |
| Germany | \$ 68.12 | -19.0% ↑ | \$ 88.23 | -9.4% ↑ | \$ 284.12 | 18.3% ↓ |
| Japan | n/a | n/a | n/a | n/a | n/a | n/a |
| Canada's Rank, (from Highest) | 2 | | 2 | | 2 | |

- **Fixed Broadband Internet:** In the Fixed Broadband Internet category, Canada ranked third highest in pricing in the Level 1 and Level 3 service baskets, fourth in the Level 2 service basket and second in the Level 4 and Level 5 service baskets.

Table 3: Fixed Broadband Internet: International Price Comparison and Canada's Price Difference Relative to Foreign Jurisdictions

| Country | Service Basket Level | | | | | |
|-------------------------------|----------------------|----------|------------------------|----------|------------------------|----------|
| | Level 1: 3 to 9 Mbps | | Level 2: 10 to 15 Mbps | | Level 3: 16 to 40 Mbps | |
| Canada | \$ 41.94 | ▼ | \$ 58.88 | ▼ | \$ 63.48 | ▼ |
| U.S.A. | \$ 79.64 | 47.3% ↓ | \$ 83.85 | 29.8% ↓ | \$ 97.53 | 34.9% ↓ |
| Australia | \$ 58.38 | 28.2% ↓ | \$ 54.49 | -8.1% ↑ | \$ 57.41 | -10.6% ↑ |
| U.K. | n/a | n/a | n/a | n/a | \$ 40.43 | -57.0% ↑ |
| France | n/a | n/a | \$ 73.83 | 20.3% ↓ | n/a | n/a |
| Italy | n/a | n/a | \$ 64.29 | 8.4% ↓ | \$ 41.77 | -52.0% ↑ |
| Germany | \$ 28.28 | -48.3% ↑ | n/a | n/a | \$ 49.75 | -27.6% ↑ |
| Japan | n/a | n/a | \$ 51.75 | -13.8% ↑ | \$ 71.52 | 11.2% ↓ |
| Canada's Rank, (from Highest) | 3 | | 4 | | 3 | |

| Country | Service Basket Level | | | |
|-------------------------------|-------------------------|----------|------------------------|-----------|
| | Level 4: 41 to 100 Mbps | | Level 5: Over 100 Mbps | |
| Canada | \$ 78.77 | ▼ | \$ 114.65 | ▼ |
| U.S.A. | \$ 112.30 | 29.9% ↓ | \$ 127.69 | 10.2% ↓ |
| Australia | \$ 71.03 | -10.9% ↑ | n/a | n/a |
| U.K. | \$ 54.20 | -45.3% ↑ | \$ 57.56 | -99.2% ↑ |
| France | \$ 63.80 | -23.5% ↑ | \$ 70.54 | -62.5% ↑ |
| Italy | \$ 53.02 | -48.6% ↑ | n/a | n/a |
| Germany | \$ 61.78 | -27.5% ↑ | \$ 56.57 | -102.7% ↑ |
| Japan | \$ 49.78 | -58.3% ↑ | \$ 71.36 | -60.7% ↑ |
| Canada's Rank, (from Highest) | 2 | | 2 | |

- **Mobile Wireless Internet:** In the Mobile Wireless Internet category, Canada ranked third most expensive in all three service baskets.

Table 4: Mobile Wireless Broadband: International Price Comparison and Canada's Price Difference Relative to Foreign Jurisdictions

| Country | Service Basket Level | | | | | | | | |
|-------------------------------|---------------------------------|---------|---|----------------------------------|---------|---|-------------------------|---------|---|
| | Level 1: 2 GB to less than 5 GB | | | Level 2: 5 GB to less than 10 GB | | | Level 3: 10 GB and more | | |
| Canada | \$ 46.47 | | ▼ | \$ 63.30 | | ▼ | \$ 80.98 | | ▼ |
| U.S.A. | \$ 50.68 | 8.3% | ↓ | \$ 76.93 | 17.7% | ↓ | \$ 110.38 | 26.6% | ↓ |
| Australia | \$ 15.57 | -198.5% | ↑ | \$ 29.67 | -113.3% | ↑ | \$ 48.17 | -68.1% | ↑ |
| U.K. | \$ 17.61 | -163.9% | ↑ | \$ 21.07 | -200.4% | ↑ | \$ 24.47 | -230.9% | ↑ |
| France | \$ 14.98 | -210.1% | ↑ | \$ 28.11 | -125.2% | ↑ | \$ 63.45 | -27.6% | ↑ |
| Italy | \$ 14.35 | -223.8% | ↑ | \$ 21.71 | -191.6% | ↑ | \$ 31.58 | -156.4% | ↑ |
| Germany | \$ 23.56 | -97.3% | ↑ | \$ 37.31 | -69.7% | ↑ | n/a | n/a | |
| Japan | \$ 51.81 | 10.3% | ↓ | \$ 73.74 | 14.2% | ↓ | \$ 87.09 | 7.0% | ↓ |
| Canada's Rank, (from Highest) | 3 | | | 3 | | | 3 | | |

- **Bundled Services:** In the Bundled Services category, Canada ranked most expensive in the Level 1 service basket and third in the Level 2 and Level 3 service baskets.

Table 5: Bundled Service: International Price Comparison and Canada's Price Difference Relative to Foreign Jurisdictions

| Country | Bundled Service Level | | | | | | | | |
|-------------------------------|---|---------|---|---|---------|---|---|---------|---|
| | Level 1: Wireline, Wireless & Fixed Broadband | | | Level 2: Wireline, Fixed Broadband & TV | | | Level 3: Wireline, Wireless, Fixed Broadband & TV | | |
| Canada | \$ 161.63 | | ▼ | \$ 135.60 | | ▼ | \$ 185.06 | | ▼ |
| U.S.A. | \$ 141.40 | -14.3% | ↑ | \$ 145.92 | 7.1% | ↓ | \$ 196.70 | 5.9% | ↓ |
| Australia | n/a | n/a | | \$ 91.85 | -47.6% | ↑ | \$ 142.45 | -29.9% | ↑ |
| U.K. | \$ 67.19 | -140.5% | ↑ | \$ 45.17 | -200.2% | ↑ | \$ 65.27 | -183.5% | ↑ |
| France | n/a | n/a | | \$ 60.55 | -123.9% | ↑ | \$ 98.63 | -87.6% | ↑ |
| Italy | n/a | n/a | | \$ 66.94 | -102.6% | ↑ | \$ 81.91 | -125.9% | ↑ |
| Germany | \$ 116.68 | -38.5% | ↑ | \$ 63.54 | -113.4% | ↑ | \$ 127.15 | -45.6% | ↑ |
| Japan | \$ 154.11 | -4.9% | ↑ | \$ 151.08 | 10.2% | ↓ | \$ 198.54 | 6.8% | ↓ |
| Canada's Rank, (from Highest) | 1 | | | 3 | | | 3 | | |

Caveats to the Interpretation of the Findings of this Study

As indicated above, the purpose of this Study is to provide a detailed comparative price analysis of telecommunications services in Canada vis-à-vis the US and six other countries. However, there are a number of caveats that should be taken into account by the reader in interpreting the findings of this and previous years' Studies.

The price comparisons are based on price data collected through a survey conducted in January and February of this year. As prices for telecommunications services are constantly evolving, the prices cited in this Study represent a 'snapshot' of prices in time. Also, the price differentials found are highly sensitive to currency fluctuations.

The Canadian prices are based on a survey of service providers in 6 cities, the American prices on 4 cities and prices in the other 6 foreign jurisdictions are based on service providers found in their principal cities. Thus, the prices cited for Canada, US or the international jurisdictions are not meant to be statistically representative of the individual countries as a whole.

Prices in Canada and international jurisdictions are driven by a complex mix of a number of factors: cost of service, competitive positioning, technological advances, consumer behaviour and regulatory frameworks. As wireless technology is constantly improving and consumers demand ever more bandwidth and data caps, service providers are constantly increasing features. In the Study, these changes are reflected by the need to regularly update the definition of service baskets. Hence, price increases in those baskets may in part, simply reflect better service levels offered to consumers.

This Study did not take into account the network technologies deployed in the networks nor the speed or quality of service of those networks. Finally, this Study did not account for any cost of service or socio-economic factors that may be relevant for price differences across different domestic and international jurisdictions. Thus, factors such as population density, terrain and climate have significant impacts on the cost of service. Similarly, socio-economic factors such as affordability indicators (i.e. mobile prices in relation to disposable income), number of handsets per subscriber, number of minutes of usage per subscriber and other factors were not within the scope of this Study.

1. Introduction

This is the 9th (2016) edition of the annual telecommunications services price comparison Study since its inception in 2008. This Study was prepared by Nordicity for the CRTC. The purpose of this Study is to provide a detailed comparative price analysis of telecommunications services in Canada vis-à-vis the US and six other foreign jurisdictions.

As in previous years, telecommunications services in this Study are classified in five main categories, including:

- Fixed Telephony;
- Mobile Wireless Telephony³;
- Fixed Broadband Internet;
- Mobile Wireless Internet; and
- Bundled Services.

Prices were measured for different pre-defined service baskets under each category. Individual service baskets were defined according to increasing level of service usage and feature availability under each category. The total number of service baskets under each category were established according to the availability of distinct levels of service usage and features offered as well as their associated prices.

In comparison to last year's Study, no major changes were made with respect to the Study design or the scope of analysis⁴. However, the following additions were made in this Study:

- 1) Analysis to show the comparison between Bring Your Own Device (BYOD) and Mobile Wireless Term Contract options (see Section 4.3)
- 2) Canadian Voice over Internet Protocol (VoIP) bundle (Voice + Internet) price comparison (see Section 8)
- 3) Finally, the following new service providers were added to different service baskets:

³ Refers to Mobile Wireless Telephony and Text Messaging Services (TMS).

⁴ As noted in detail in respective sections, some revisions were made to reflect current trends and to further improve comparability. For example, the definitions of fixed broadband service basket Levels 1 and 2 were revised according to current market trends. That is, very few service providers in one or two jurisdictions offered Internet with < 3Mbps download speed. Therefore, the minimum download speed was increased to 10 Mbps in the definition of Level 2 service basket. Likewise, service basket Level 5 was added to fixed broadband category in order to capture service offerings of over 100 Mbps - and so forth.

| | |
|----------------------------------|--|
| Fixed Telephony | Canada <ul style="list-style-type: none"> - Teksavvy (Montreal, Toronto) |
| Mobile Wireless Telephony | Canada <ul style="list-style-type: none"> - Primus (Halifax, Winnipeg, Regina) - Chatr (Montreal) - Petro Canada (all cities) - 7-Eleven Speakout (all cities) US <ul style="list-style-type: none"> - T-Mobile (all cities) Foreign Jurisdictions <ul style="list-style-type: none"> - O2 (London and Berlin) - Three (London) - Bouygues Telecom (Paris) |
| Mobile Wireless Internet | US <ul style="list-style-type: none"> - T-Mobile (all cities) Foreign Jurisdictions <ul style="list-style-type: none"> - O2 (London and Berlin) - Three (London) - Bouygues Telecom (Paris) |
| VoIP | Canada <ul style="list-style-type: none"> - Teksavvy (all cities) - Vonage (all cities) - Primus (all cities) |

This Study is organized as follows: Section 2 describes the Study Design as well as the methodology behind both the practices of data collection and data analysis. Sections 3 to 7 are dedicated to each of the five service categories.

Sections 3 to 7 provide a detailed definition of the service baskets, a description of changes made between last year's Study and this year's Study, a list of service providers surveyed in different jurisdictions and a detailed price comparison amongst both Canadian cities as well as between Canada and international jurisdictions in each respective service category. Section 8 provides a comparative analysis of Canadian VoIP bundled services.

2. Methodology

2.1 Service Basket Design

The methodology for the service basket design and prices in this year’s Study has been kept consistent with that used in last year’s Study with the exception of some modifications to reflect the increasing level of consumer usage amongst telecommunications services. These modifications are described below in greater detail.

The price comparison methodology used in this Study is based on a service basket approach where separate telecommunications service baskets are defined on the basis of increasing levels of service usage, features and, where applicable, performance:

- **Level 1:** Entry-level or low-volume usage
- **Level 2:** Average or medium usage
- **Level 3:** Above average or high-volume usage
- **Levels 4 and 5:** Very high-volume or unlimited usage
- **Level 6:** Ultra high-volume or unlimited usage⁵

The number of defined service basket levels for each of the stand-alone telecom services considered in this Study varies from three to six.

- **Fixed Telephony:** Basket Levels 1 to 3
- **Mobile Wireless Telephony:** Basket Levels 1 to 6
- **Fixed Broadband Internet:** Basket Levels 1 to 5
- **Mobile Wireless Internet:** Basket Levels 1 to 3
- **Bundles Services:** Basket Levels 1 to 3

Services.

Table 6 below summarizes the service baskets that have been considered in the 2016 Study vis-à-vis last year’s Study. Note that no changes were made in the service basket levels for the Fixed Telephony or Bundled Services.

Table 6: Summary of Service Baskets in 2015’s Study in comparison to 2016’s Study

| Fixed Telephony | | Mobile Wireless Telephony | | Fixed Broadband Internet | | Mobile Wireless Internet | | Bundled Services | |
|-----------------|---------|---------------------------|----------------|--------------------------|----------------|--------------------------|----------------|------------------|---------|
| 2015 | 2016 | 2015 | 2016 | 2015 | 2016 | 2015 | 2016 | 2015 | 2016 |
| Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 | Level 1 |
| Level 2 | Level 2 | Level 2 | Level 2 | Level 2 | Level 2 | Level 2 | Level 2 | Level 2 | Level 2 |
| Level 3 | Level 3 | Level 3 | Level 3 | Level 3 | Level 3 | | Level 3 | Level 3 | Level 3 |
| | | Level 4 | Level 4 | Level 4 | Level 4 | | | | |
| | | Level 5 | Level 5 | | Level 5 | | | | |
| | | | Level 6 | | | | | | |

⁵ Based on preliminary research and current market trends, we believe that high-level usage has increased significantly, particularly in case of wireless services. Therefore, in order to ensure the completeness of our analysis, we added a new Level 6 to last year’s basket list.

The three levels of bundled services included were defined as follows:

- **Bundle 1:** Fixed Telephony, Fixed Broadband Internet, and Mobile Wireless Telephony
- **Bundle 2:** Fixed Telephony, Fixed Broadband, and Digital TV
- **Bundle 3:** Fixed Telephony, Fixed Broadband, Mobile Wireless Telephony, and Digital TV

Consistent with last year's Study, Level 2 stand-alone service baskets are generally used in each of the bundles. In some cases, however, there are restrictions on the specific service elements that are eligible for bundling discounts. In such cases, eligible service elements are included instead (which can involve including a Level 3 or 4 rather than Level 2 service element). For the Digital TV service component, a 'basic' digital television service package⁶ option is selected for inclusion in the applicable bundles.

The specific service elements included in each service basket are described in the following sections.

2.2 Canadian Price Data Collection

The Canadian price comparisons included in this year's Study are based on the measurement of prices of pre-defined distinct service baskets, in six Canadian cities (Halifax, Montreal, Toronto, Winnipeg, Regina and Vancouver). Between two to seven services providers per service category were examined in each city, covering stand-alone and bundled service baskets, as applicable for each service provider.

The Canadian price data has been collected from a wide range of telecommunications service providers (TSPs) including incumbent telephone companies (for example: Bell Canada, MTS, SaskTel, and TELUS) and incumbent cable companies (for example: Eastlink, Videotron, Rogers, Shaw, and Cogeco). The Study also includes service price data from four service resellers, amongst them are Primus, PC Mobile, Petro-Canada Mobile and 7-Eleven Speakout. Furthermore, the Study includes services provided by flanker brands such as Koodo, Public Mobile, Chatr, Fido, Mobilicity and Virgin, as well as the 'new' (2008) entrants in the mobile market such as Videotron, Eastlink and WIND⁷. Table A₁, in Appendix A provides a list of the Canadian service providers surveyed in this year's Study, broken down by city and by service basket.

City-specific prices for each of the stand-alone and bundled service baskets offered by the service providers listed in Table A₁ (Appendix A) were weighted according to each service provider's respective estimated subscriber-based market share.⁸ Similarly, in calculating Canada-wide market prices, city-specific prices were aggregated and weighted according to city population. Weighted average prices for each surveyed city and for Canada are provided in Appendix B for each of the service baskets and bundles included in this Study.

In order to maintain consistency with previous years' studies (2011 to 2015), the incumbents' flanker brand service prices were not included in the calculation of the aforementioned city-specific or national aggregate prices. However, Section 4.2 provides an additional analysis of the incumbents' flanker brand prices with incumbents' and new entrants' mobile wireless prices.

⁶ Bundled Service price comparison does not include the "Skinny" basic TV service which was mandated by the CRTC and became effective April 1st, 2016, after the completion of the data collection for this Study.

⁷ In December, 2015, Shaw Communications announced plans to purchase Wind Mobile. The transaction was completed on March 1, 2016 (<http://newsroom.shaw.ca/materialDetail.aspx?MaterialID=6442451782>)

⁸ The estimated market shares were drawn from CRTC's annual Communications Monitoring Report (CMR) for 2015 and 2014. Consistent with the previous year's report, we estimated market shares for wireline services on a city-specific basis whereas for mobile wireless services and residential broadband services, the estimates were based on province-specific and national data, respectively. Mobile Internet market shares were based on mobile wireless market shares and the service bundle shares were based on the combination of the wireline, mobile wireless and broadband market shares.

For the Mobile Wireless Telephony service analysis, this year's Study also examined BYOD price discounts in contrast to the other device financing options available in the Canadian market.

The price data collected for this Study was drawn from the surveyed service providers' websites and, where necessary, supplemented with further clarifications from consumer service representatives (CSRs).⁹ The price data reflects currently advertised prices that are available to new consumers or existing consumers changing service plans. In all cases, the lowest available currently advertised regular or standard price was used to determine price of each service basket. Short-term promotional offers and prices were not taken into account.

2.3 International Price Data Collection

This year's Study included seven foreign jurisdictions for the purpose of comparing telecommunications service prices with those offered in Canada. These seven jurisdictions included: the US, UK France, Germany, Italy, Japan and Australia. With the exception of the US, the price data was collected for the services available in each country's largest city.

For the US, the following four cities were selected for collecting price data: Boston, MA; Kansas City, MO; Minneapolis, MN; Seattle, WA. In each case, price data was collected for the services provided by the major service providers in those cities.

Table A 2, in Appendix A provides a list of the international service providers included in the Study by city and service baskets.

To maintain consistency with last year's Study, the US's regional brand services prices were not included in the calculation of the US aggregate prices. Accordingly, this year's Study has excluded the section pertaining to the US's Incumbent and Regional Service Provider Prices.

For the remaining six jurisdictions, the collected price data corresponds to services provided by incumbent service providers.

For the purpose of comparing international price data, foreign currency prices were converted to Canadian dollars (CAD) using the Bank of Canada's monthly average exchange for the month of February 2016¹⁰. The prices were further adjusted for the purchasing power parity (PPP) differences between countries using the OECD's PPP comparative price level indices for February, 2016.¹¹

2.4 Summary of Changes in Methodology

Relative to the previous year, the changes in methodology and updates made in this Study are outlined below:

- **Fixed Telephony:** For this year's Study, Teksavvy (reseller) was added (Montreal and Toronto only) to the list of Canadian Fixed Telephony service providers
- **Mobile Wireless Telephony**
 - This year, Mobilicity (Rogers) and Public Mobile (TELUS) were included as flanker brands rather than new entrants.
 - Primus was added to the list of resellers for all Canadian cities.

⁹ The 2016 Canadian Price data was captured over the period covering the second week January 2016 to third week of February 2016.

¹⁰ Bank of Canada's foreign currency conversion rates are available at <http://www.bankofcanada.ca/stats/assets/pdf/nrma-2016-02-en.pdf>

¹¹ The OECD's latest data on PPP is available at: <http://www.oecd.org/std/prices-ppp/purchasingpowerparitiespppsdata.htm>

- This year's Study was based on the least expensive lite devices available from each service operator rather than the premium devices included in last year's Study.
- New service Level 6 (Family Basket) was added.
- US long distance cost, previously included in Levels 2 and 3 was removed.
- Additional analysis on Bring Your Own Device (BYOD) added in this year's Study.
- **Fixed Broadband Internet Service**
 - Teksavvy was removed from Winnipeg and Regina.
 - Netago (broadband service provider) was added in analysis of rural markets of Canada.
 - Level 1 advertised download speed range increased from 1 - 3 Mbps to 3 – 9 Mbps.
 - Level 2 advertised download speed range increased from 3 - 10 Mbps to 10 – 15 Mbps.

Further details and the rationale with respect to above changes are provided in the respective sections of the five service categories.

3. Fixed Telephony Service

3.1 Fixed Telephony Service Baskets

Consistent with last year's Study, the following service element charges were considered for Fixed Telephony service baskets:

- Access line charges (including, as applicable, free calling allowances);
- Local usage/calling charges (where applicable);
- Long distance charges both domestic and international calls;
- Optional feature charges (such as voicemail, call display, and other features); and
- Other recurring charges, where applicable, such as 9-1-1, network access fees, and/or other surcharges or regulatory fees.

It should be noted that one-time service charges, such as installation and activation fees were excluded from the comparison.

Fixed Telephony service basket definitions in this year's Study are identical to those used in last year's Study with the exception of the removal of VoIP plans from our analysis¹². Accordingly, the three Fixed Telephony service baskets included in this Study were defined as below:

- **Level 1:** 400 incoming and outgoing minutes per month, with 10% of outgoing minutes treated as long distance, and no optional features.
- **Level 2:** 1,000 incoming and outgoing minutes per month, with 20% of outgoing minutes treated as long distance, and two optional features (voice mail and call display).
- **Level 3:** 1,600 incoming and outgoing minutes per month, with 30% of outgoing minutes treated as long distance, and a full set of optional features.

Table B. 1 in Appendix B provides a detailed summary of the service elements used for the fixed wireline telephony price comparison.

3.2 Canadian Fixed Telephony Service Prices

Figure 1 (Canadian Fixed Telephony Service Prices) below, provides an overview of the changes in Level 1, 2 and 3 service basket prices since 2015. On average, Fixed Telephony prices portray a decreasing trend - overall prices decreased by 2.8% (Level 1), 7.1% (Level 2), and, 6.2% (Level 3). The decreases are reflected in all surveyed cities, except Halifax (Levels 1-3), Vancouver (Level 1) and Winnipeg (Level 1).

¹² Last year's study considered both traditional Fixed Telephony and VoIP services in the Fixed Telephony service category whereas our Study considers VoIP in a separate analysis.

Figure 1: Year-over-Year (YoY) Change in Canadian Fixed Telephony Prices (2015-2016)

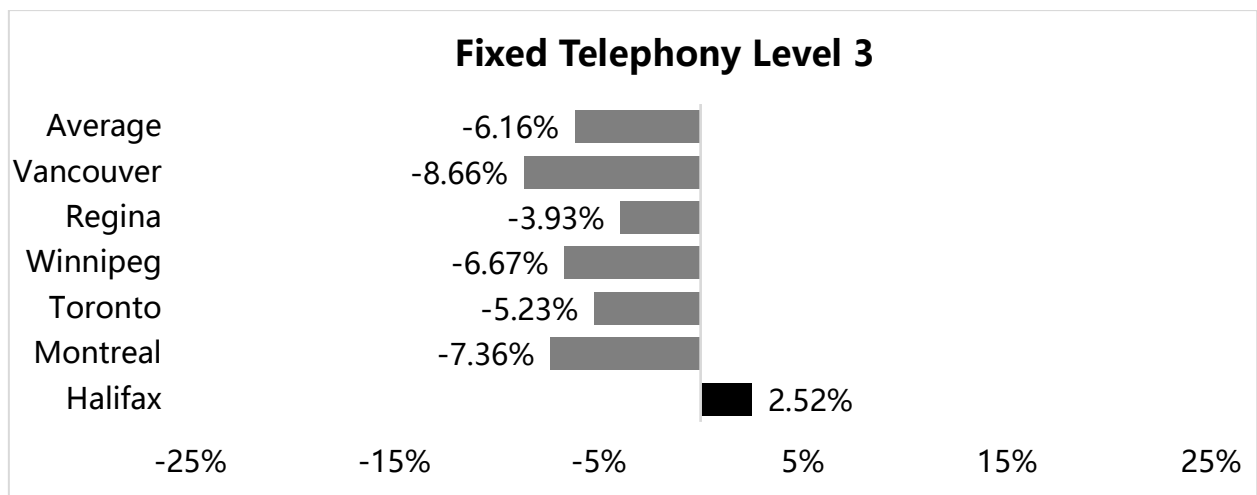
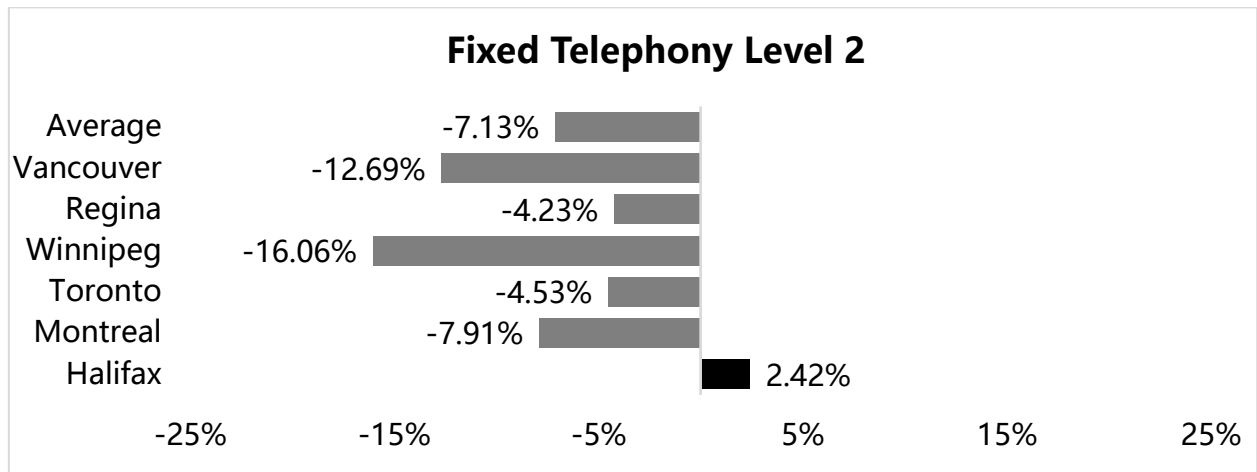
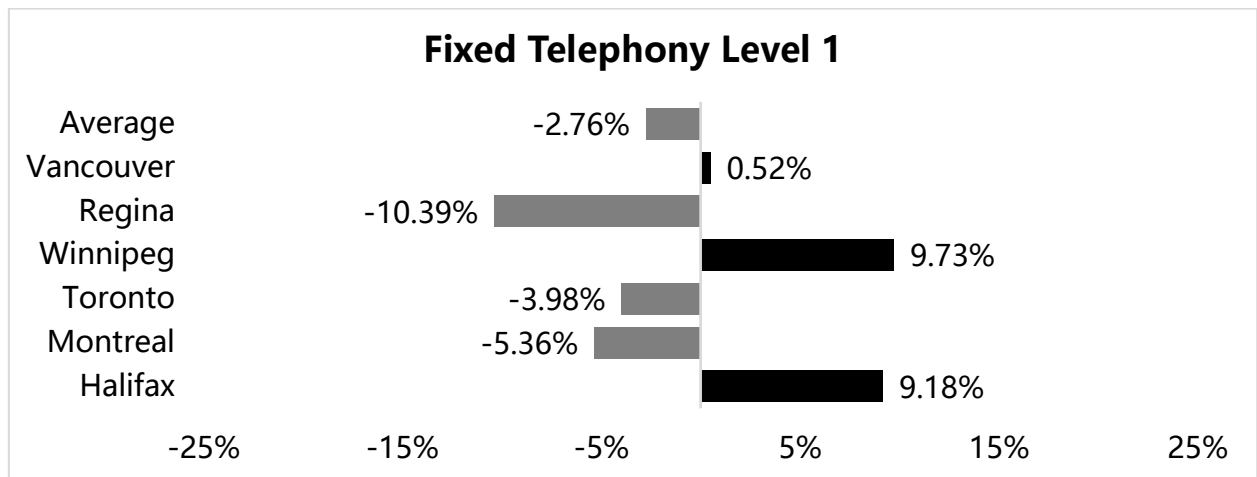
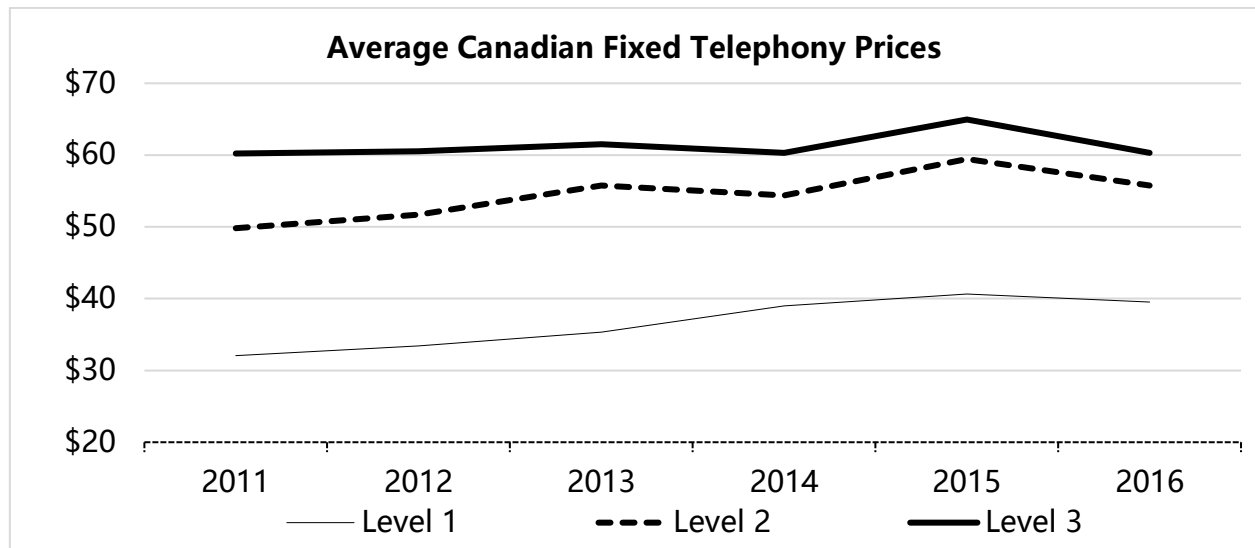


Figure 2 below, provides a summary of the average Canadian monthly prices for each of the three Fixed Telephony service baskets for the period of 2011 to 2016. Detailed Fixed Telephony prices for the period of 2008 to 2016 by service basket and surveyed cities (i.e. Halifax, Montreal, Toronto, Winnipeg, Regina and Vancouver) are provided in Figure C.1 and Table C. 1 in Appendix C.

Figure 2: Average Canadian Fixed Telephony Prices by Service Baskets (2011-2016)



Key trends in Canadian Fixed Telephony prices for three service baskets over the last six years are summarized below.

- Level 1 prices decreased from \$40.64 in 2015 to \$39.52 in 2016, a decrease of 2.8%. Average 2016 Level 1 prices varied widely by city, ranging from as low as \$24.50 in Regina to \$45.52 in Toronto. Since 2008, Level 1 prices increased at an average annual rate of 3.1%.
- Level 2 prices decreased from \$59.44 in 2015 to \$55.78 in 2016, a decrease of 6.2%. Average 2016 Level 2 prices also varied widely by city, ranging from \$39.20 in Regina to \$61.49 in Toronto. Over the period of 2008 to 2016, Level 2 prices have increased at average annual rate of 1.9%.
- Lastly, Level 3 prices decreased from \$64.96 in 2015 to \$60.32 in 2016, a decrease of 7.1%. In this case, the lowest average Level 3 price was found in Vancouver at \$45.98 and the highest price was in Halifax at \$71.38. For Level 3 there has been no change in prices since 2008, on an annual rate basis.

3.3 International Fixed Telephony Service Prices

When comparing international prices for Fixed Telephony services, many pricing variables were taken into account. These variables are described below:

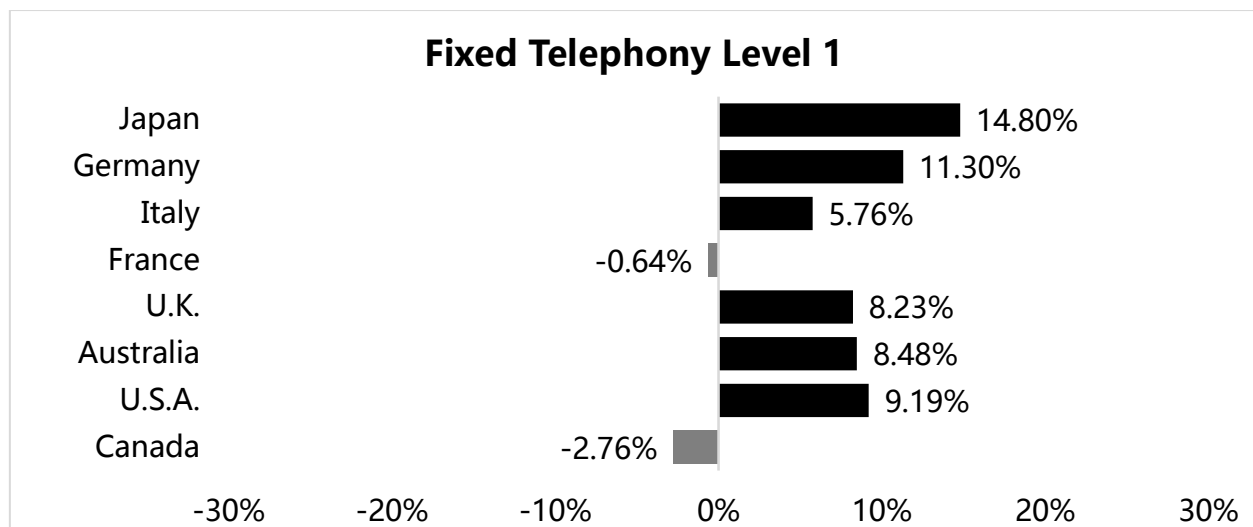
- **Price Structure:** Wireline rate structures in many foreign jurisdictions differ significantly in comparison to Canada (as well as the US) where unlimited local calling is the norm. Local phone service rates in Europe, Japan and Australia are often set on a usage basis. In the case of local calls, per minute charges apply along with a per call set-up or connection fee, both of which can vary

depending on the selected service plan.¹³ Charges also vary depending on whether a call is made to a landline or mobile number (and can also vary by mobile service provider). Local and national per minute and per call rates are generally the same; as a result, there is typically no price difference between local and domestic long distance calling rates.¹⁴ However, new service plans or add-ons are increasingly available in the examined foreign jurisdictions. Many of these plans offer unlimited national fixed and/or mobile calling options.

- **Integrated VoIP and Broadband Service:** In some areas of Europe, Fixed VoIP Telephony service is not offered as a standalone service. Instead Fixed VoIP services are integrated with broadband services offerings. As part of broadband service offerings, such VoIP plans often include unlimited national calling to fixed and/or mobile lines as well as relatively low cost international calling plans.
- **Regulatory Fees:** In the US, there are a number of unique regulatory fees and surcharges (other than sales taxes). These include, among other things, the federal subscriber line charge (SLC) and universal service fund (USF) charges. Collectively, these fees can add up to as much as \$4 to \$24 per month over and above a service provider’s local, long distance and feature charges. The range and magnitude of these charges, however, vary by state and municipality.¹⁵ As in previous years' studies, the principal surcharges applied in the US, namely the SLC and USF, are included in the Study. In most of the surveyed countries, including the US, emergency 911 fees apply and, therefore, they are also included in the Study.

Figure 3 below, provides a year-over-year representation of changes in international Fixed Telephony prices from 2015 to 2016.

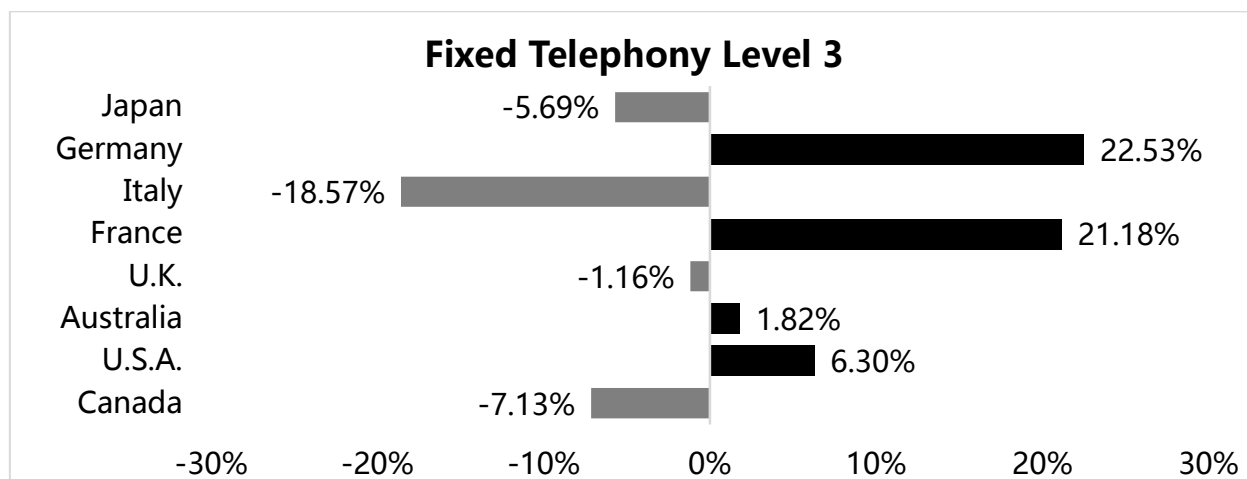
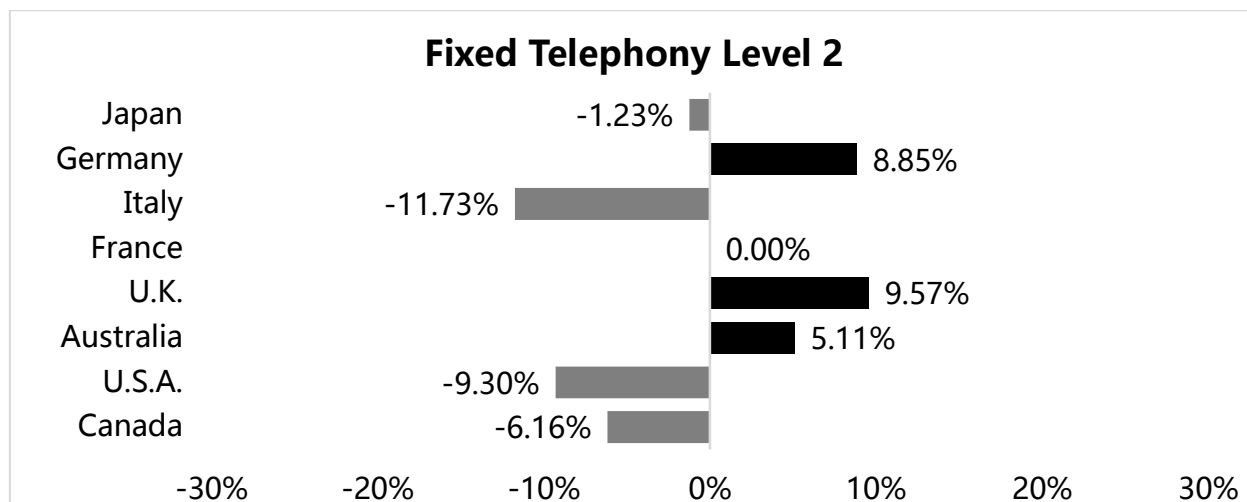
Figure 3: Change in International Fixed Telephony Prices for Level 1 to 3 Service Baskets Since 2015



¹³ Australia is unique among the three regions in that local calls to landlines are charged on a per call basis with no additional per minute charges.

¹⁴ Australia differs somewhat in this respect. Under some home phone service plans different per minute rates can apply depending on the distance of a domestic call.

¹⁵ Amongst the sources used to obtain such surcharges and fees were the Federal Communications Commission’s (FCC) reports and telecommunication providers’ websites. However, as noted in the 2015 Study, obtaining precise information on these fees and surcharges is extremely difficult and even company CSRs are unable to provide complete information with regard to these surcharges given they vary so widely by location. In such cases, estimated surcharges have been used.

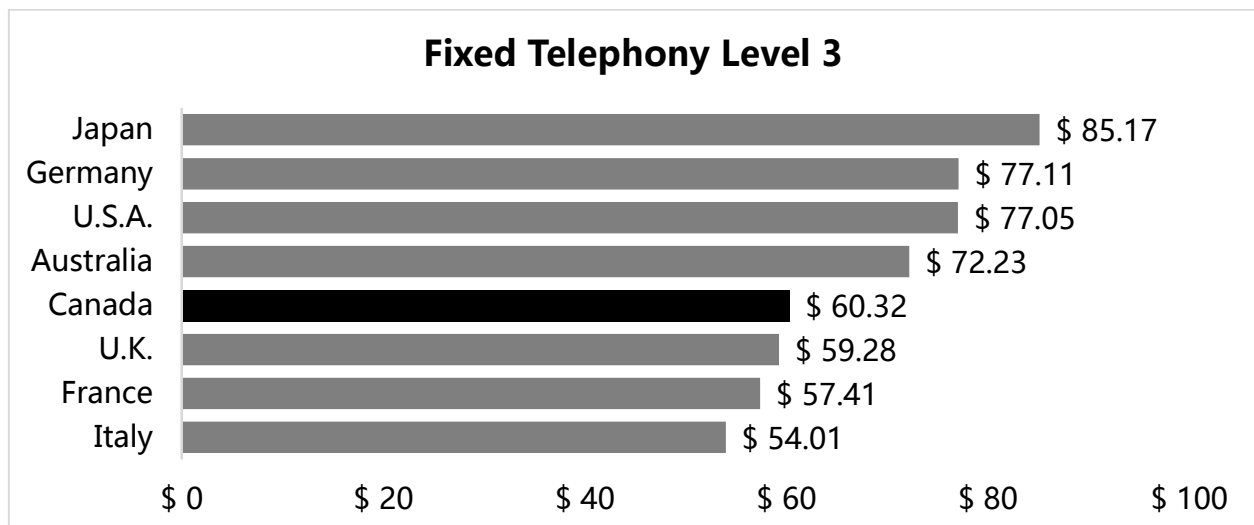
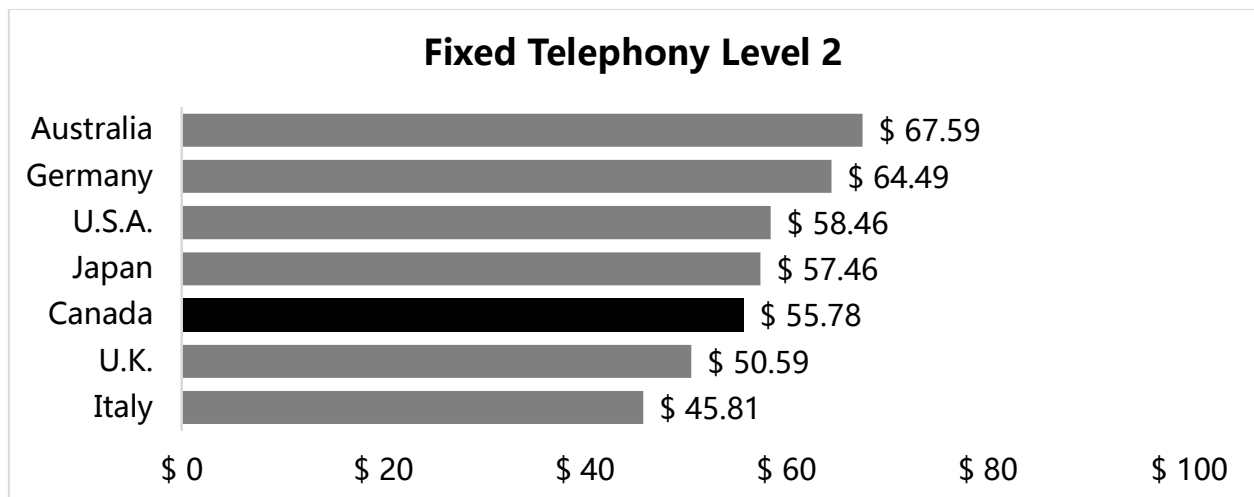
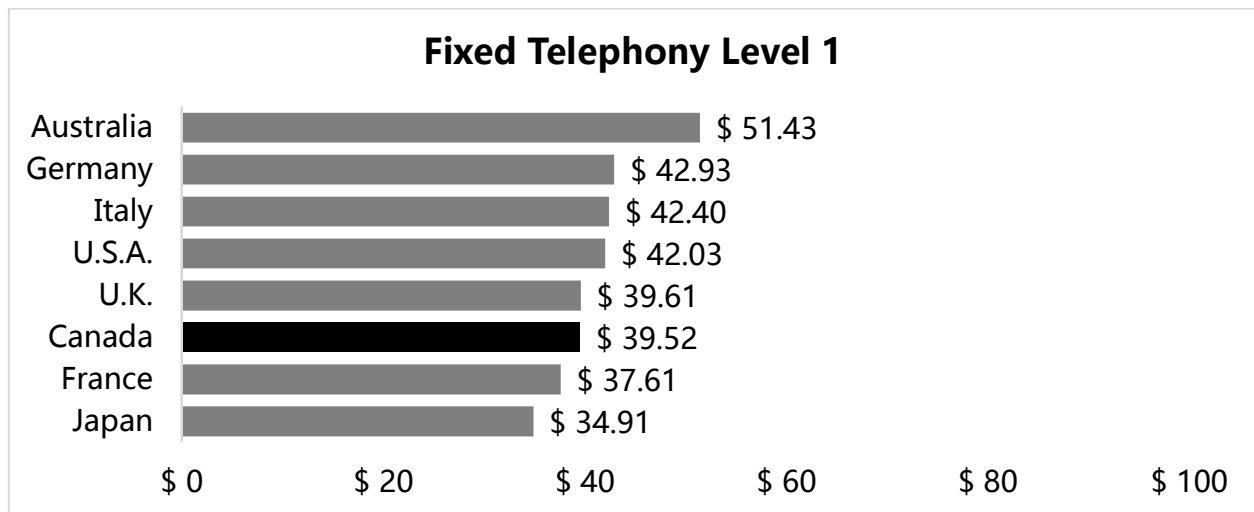


Level 1 service basket prices showed an increasing trend in the case of foreign jurisdictions with the exception of France. The major increases in Level 1 prices within the last year were in Japan (15%), Germany (11%) and the US (9%). Most of these price variations are attributable to differences in the currency exchange rates and PPP adjustment factors relative to the previous year. For example, in original currencies, the Level 1 price in Japan actually decreased by 2% and in Germany the increase was only 4% over the past year.

In the Level 2 and Level 3 service baskets, the trend in price change over the past year was mixed. For example, Level 2 prices increased in Germany (9%), UK (10%), and, Australia (5%) whereas Level 2 prices decreased in Italy (12%), US (9%) and Japan (1%). Level 3 prices increased in Germany (23%), France (21%), US (6%), and Australia (2%) whereas Level 3 prices decreased in Italy (19%), Japan (6%) and UK (1%). Level 2 and Level 3 price variations in foreign jurisdictions are also attributable to a difference in currency conversion rates and PPP adjustment factors relative to the previous year. For example, in original currency, prices in Germany only increased by 1.7% (Level 2) and 14.5% (Level 3).

Figure 4 below, provides a comparison of current average Fixed Telephony prices between Canada and the seven foreign jurisdictions for each of the three service baskets. All prices are expressed in PPP-adjusted Canadian dollars and exclude taxes (e.g., VAT or GST). Figure D. 1 and Table D. 1 in Appendix D provide detailed historical international wireline service basket information for the period of 2008 to 2016.

Figure 4: 2016 International Fixed Telephony Price Comparison (PPP-adjusted CA\$)



The key findings are outlined below:

- For the Level 1 Fixed Telephony service basket, the average price paid by Canadians was \$39.52 per month, which was 4% lower than the average of \$41.31 of the eight surveyed countries. The average Level 1 price in Canada was 3rd least expensive, only higher than those of France and Japan.
- For the Level 2 Fixed Telephony service basket, the average price paid by Canadian consumers was \$55.78 per month, which was 2% lower than the average of \$57.17 for the seven surveyed countries¹⁶. The average Level 2 price in Canada was 3rd least expensive, only higher than those of the UK and Italy.
- For the Level 3 Fixed Telephony service basket, the average price paid by Canadian consumers was \$60.32 per month, which was 11% lower than the average of \$67.82 for the eight surveyed countries. The average Level 2 price in Canada was 4th least expensive, only higher than those of the UK, France, and Italy.
- In summary, Canadian Fixed Telephony service prices were on the lower end of the group of surveyed countries in the Level 1, 2 and 3 service baskets.

¹⁶ Fixed Telephony Level 2 were not offered by the surveyed operators in France, therefore not included in the average.

4. Mobile Wireless Telephony Service

4.1 Mobile Wireless Telephony Service Baskets

For Mobile Wireless Telephony, this year's Study included the following six service baskets:

- **Level 1:** 150 incoming & outgoing minutes per month, with 10% of outgoing minutes treated as long distance, and no optional features.
- **Level 2:** 450 incoming & outgoing minutes per month, with 10% of outgoing minutes treated as domestic long distance; two optional features including voice mail and call display; and 300 text messages.
- **Level 3:** 1,200 incoming & outgoing minutes per month, with 15% of outgoing minutes treated as domestic long distance; more than two optional features, including voice mail and call display; 300 text messages; and 1 GB data usage per month.
- **Level 4:** Unlimited nationwide talk and text (no international and US calling included); more than two optional features, including voice mail and call display; and 2 GB data usage per month.
- **Level 5:** Unlimited nationwide talk and text (no international and US calling included); more than two optional features, including voice mail and call display; and 5 GB data usage per month.
- **Level 6:** Newly added this year, 'family basket' - Unlimited nationwide talk and text (no international and US calling included); more than two optional features, including voice mail and call display; and 10 GB data usage per month.

In relation to the previous year, the following changes were introduced to the current Study:

- **Devices:** This year's Study was based on the least expensive lite devices available from each service operator rather than the premium devices included in last year's Study.
- **Added family basket (Level 6):**
 - The following Wireless Service Providers (WSP) offer a shared plan, referred to as a 'family basket' in this Study.
 - All incumbents (i.e. Rogers, Bell, and TELUS) offer shared plans in all cities and Eastlink in Halifax, NS.
 - All US service providers (i.e. AT&T, Verizon, T-Mobile) offer shared plans with a maximum number of additional lines ranging from six to ten.
 - In other international jurisdictions, share plans are also typically offered with a maximum of 10 additional lines.
 - These service providers offer consumers the sharing of additional lines and data by family members – as an add-on to their main account. While the number of lines ranged from two and nine additional lines, the majority offer up to a maximum of 5 lines with a data sharing plan ranging from 500MB to 15 GB.
 - Given that share plans are offered across all jurisdictions, the family basket (Level 6) was added to this Study, which is defined as below:
 - **Service Plan:** Additional lines may be added, in most cases, to any service plan within the definitions of Level 1 and Level 2, and in all Level 3 to Level 5 plans. For this Study we defined Family basket based on existing level 5 specifications, since it provides for maximum usage (10 GB data, unlimited minutes etc.) to be shared by the family members.

- **Family Size:** As noted above, any number of additional lines up to maximum of 10 to 15 can be added, according to available offers. To be specific, we relied on Statistics Canada data to establish the average family size of ~2.9 people. Accordingly, we specified a total of three lines including one for the main account and two additional family members. We believe this represents an optimum number of lines for the family basket.
- **International Long Distance Calling:** In the previous year's Study, international long distance calling was not included in any of the five service baskets. For consistency, in this year's Study, international long distance calling is also excluded from all service baskets.
- **US Long Distance Calling:** In last year's Study, US long distance was included in the price comparison. We believe US long distance calling between the jurisdictions included in the Study is not comparable. For example, long distance calling from London (UK) to Boston is classified as 'International long distance' whereas a call from Toronto to Boston is classified as 'North American long distance'. For this reason, US long distance calling was also excluded from all six service baskets.¹⁷ Effectively, this change materially impacted the Level 2 and Level 3 prices downwards, since these two levels had accounted for US long distance charges in previous years' Studies.

In summary, the following Mobile Wireless Telephony service element charges, where applicable, are considered for price comparison purposes:

- Network access/monthly plan charges, as applicable;
- Additional calling charges, where applicable;
- Optional feature charges, as applicable (e.g., voice mail, call display and others);
- Domestic Long distance charges, where applicable;
- Text message service (TMS), where applicable;
- Data service charges, where applicable; and,
- Any other applicable monthly service charges such as emergency, universal service and/or other regulatory fees.

The Study excludes several one-time charges such as activation fees, upfront handset or device costs, and roaming charges. However, section 4.3 provides a detailed analysis of BYOD (Bring Your Own Device) in contrast to the free device with term contract options available to consumers in Canada. Section 4.5 provides a detailed pricing comparison of roaming services available to Canadian and American consumers when travelling to the US and Canada, respectively.

Table B. 2 provides a detailed summary of the service elements used for the 'Mobile Wireless Telephony and text messaging' service baskets as well as the usage assumptions.

For each of the six service baskets, prices are measured using standard mobile service plan rates offered by surveyed WSPs. This year's Study was primarily based on post-paid plans. Pre-paid plans were only included in the comparison if post-paid price plans were not available for a particular service basket. In addition, among the pre-paid plans selected, monthly device costs were added in order to reflect the implicit device cost present in post-paid plans. This additional device cost was comparable to the particular service provider's least expensive lite device amortized over a twenty-four-month period¹⁸.

Many WSPs offer post-paid plans on a no-contract or term-contract basis (the most common term being 24 months in the latter case). Term-contract service plans typically provide a means for subscribers to purchase a new handset or device at a discounted price. Such plans generally include an implicit or

¹⁷ US long distance is generally referred to as North American long distance by Canadian and US operators.

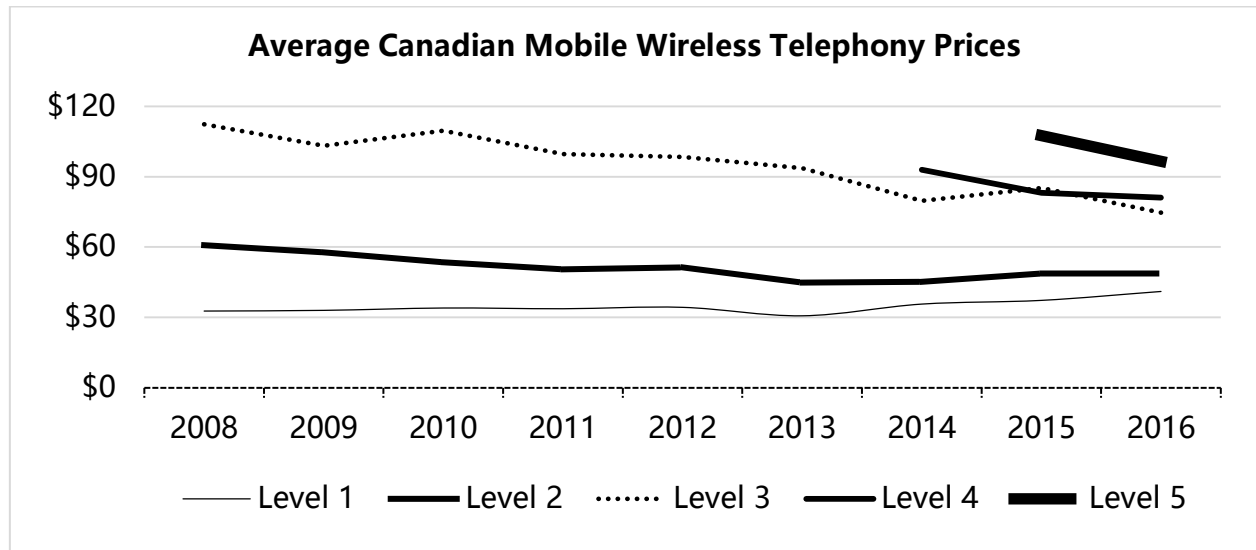
¹⁸ In case pre-paid plan offers, a consumer may choose to have a basic (low priced) device. However, in terms of methodological consistency, the cost of the least expensive Lite (smart) device price was included in the price comparison.

explicit handset cost recovery component in the service plan price. No-contract term, bring-your-own-device or SIM card only, service plans are also often available at lower price points given they do not include a handset cost recovery component. Consistent with previous years' studies, as applicable, the post-paid service plan prices collected for this Study are based on term-contract service plans.

4.2 Canadian Mobile Wireless Telephony and Prices

Figure 5 provides a historical view of the five Canadian Mobile Wireless Telephony service baskets¹⁹.

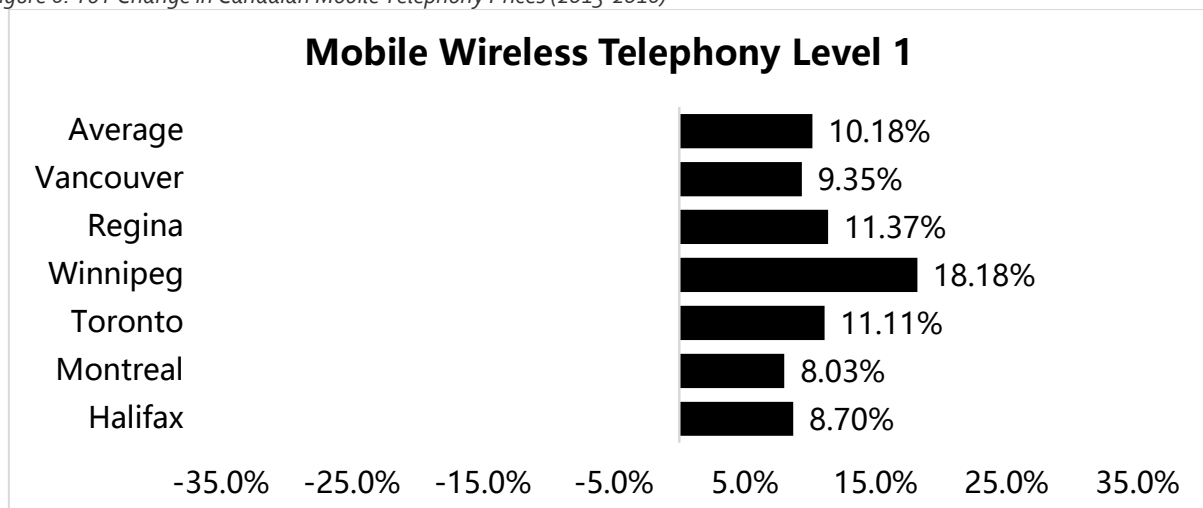
Figure 5: Average Canadian Mobile Wireless Telephony Prices by Service Baskets (2008-2016)



Mobile Wireless Telephony prices showed mixed trends across Canadian cities. For example, Level 1 prices increased and Level 3 prices decreased in six cities within the past year. However, in Levels 2, 4 and 5 the trend was mixed: prices increased in some cities and decreased in others. Year-over-Year (YoY) average price changes in the six Canadian cities are presented in

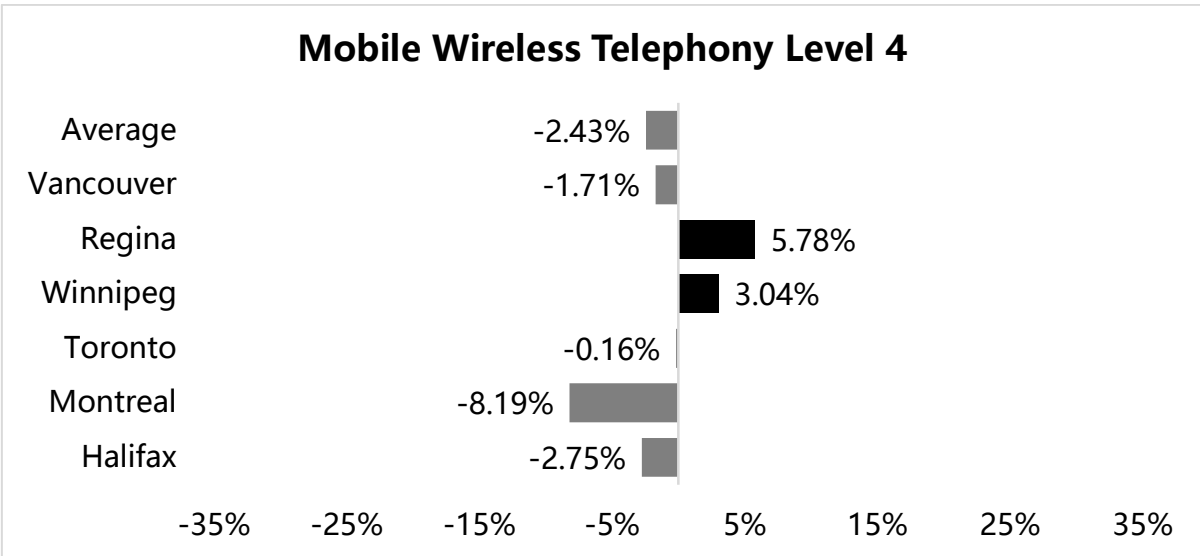
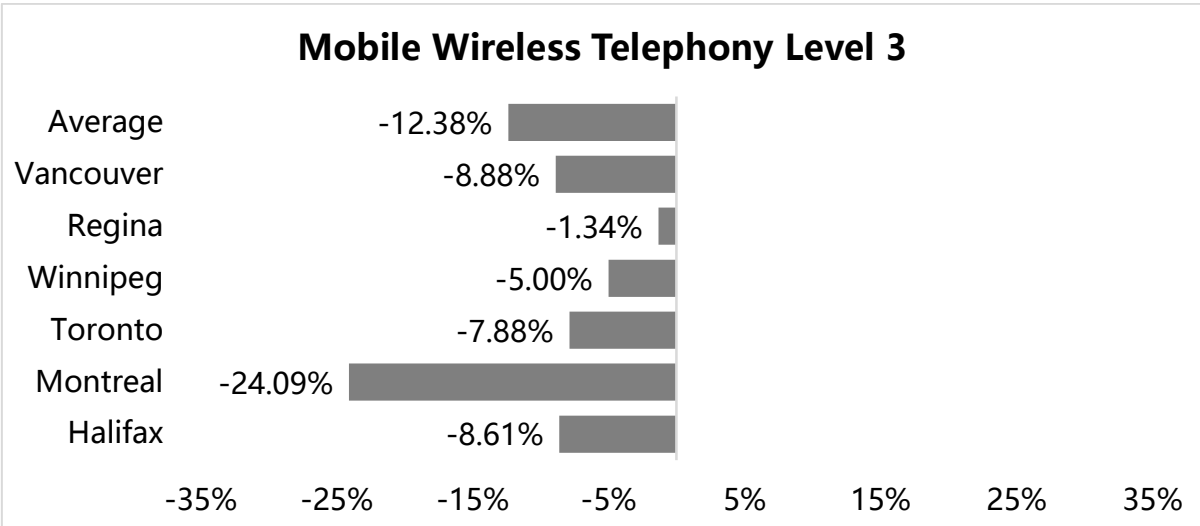
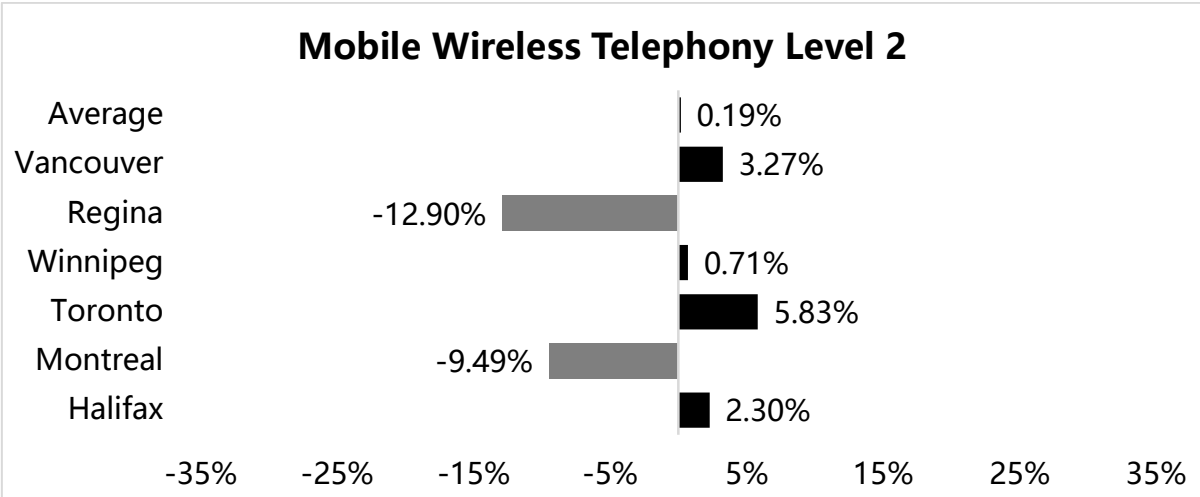
Figure 6 below.²⁰

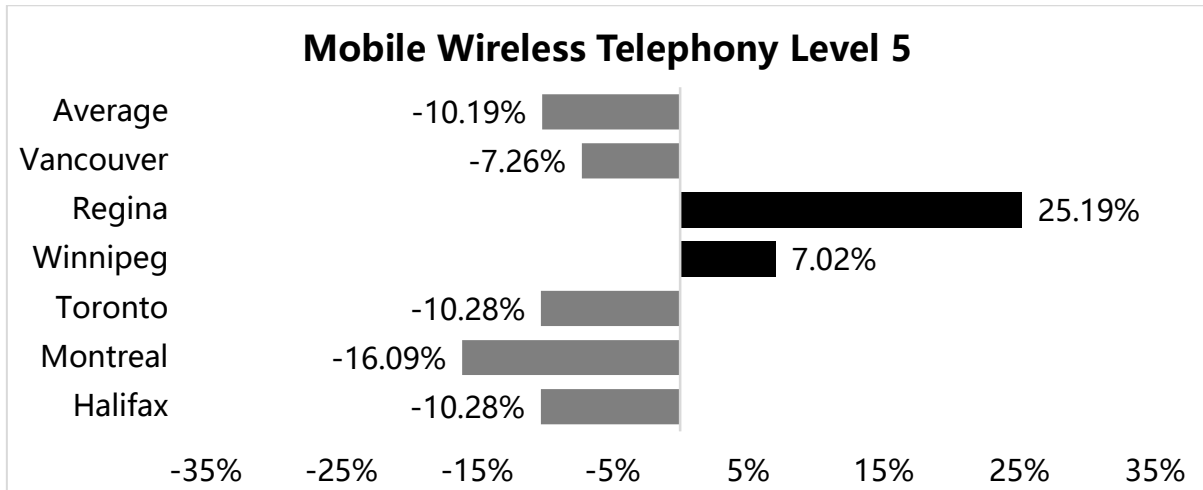
Figure 6: YoY Change in Canadian Mobile Telephony Prices (2015-2016)



¹⁹ Family Basket (Level 6) has been added this year, therefore not shown in the graph and Level 4 and Level 5 were introduced in 2014 and 2015, respectively.

²⁰ Wireless Telephony Service Basket Level 6 was newly added this year therefore not shown in the year-over-year comparison.





Major price changes occurred in Regina and Montreal, where Regina’s Level 2 price decreased by 12.9% and its Level 5 price increased by 25.2%. Montreal’s prices significantly decreased for Level 3 (24.1%) and Level 5 (16.1%).²¹

Figure C. 2 and Table C. 2, in Appendix C, provide a detailed overview of the Canadian wireless telephony and TMS service baskets prices for 2008-2016. As illustrated in Table C. 2, the trends by city are similar to that of the national average for Levels 1-4. In the case of Level 5, Regina showed a significant increase in price (25%). Since major cities - Toronto and Montreal showed a decrease of over 10%, the national average also decreased by 10.2%.

²¹ In our pricing survey, there were no obvious indicators to explain these price changes.

4.2.1 Comparison of Incumbent and New Entrant Prices

With respect to the price difference between Mobile Wireless Telephony incumbents and new entrant offerings, the trends were generally similar to those a year ago. Since no new entrants were found in Winnipeg and Regina and there is only one new entrant in remaining cities: Eastlink (Halifax), Videotron (Montreal) and Wind (Toronto and Vancouver), the new entrant prices represent a single service provider's price.

This comparison is based on the unweighted average of the price offerings of the three incumbents (TELUS, Rogers and Bell) for each city. Table 7 below, provides a summary of the price differences²².

Table 7: 2016 Mobile Wireless Price Comparison - Incumbent versus New Entrant

| City | Service Provider Type | Mobile Wireless Service Level | | | | | | Average (City) |
|-----------------|-----------------------|-------------------------------|----------|----------|----------|-----------|-----------|----------------|
| | | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 | |
| Halifax | Incumbents | \$ 38.76 | \$ 48.76 | \$ 77.10 | \$ 87.10 | \$ 108.76 | \$ 252.10 | \$ 102.10 |
| | New Entrant | \$ 30.55 | \$ 45.55 | \$ 70.55 | \$ 80.55 | \$ 110.55 | \$ 220.55 | \$ 93.05 |
| | Difference (%) | -21.19% | -6.59% | -8.49% | -7.52% | 1.64% | -12.51% | -8.86% |
| Montreal | Incumbents | \$ 40.57 | \$ 44.40 | \$ 62.40 | \$ 70.40 | \$ 78.73 | \$ 190.40 | \$ 59.30 |
| | New Entrant | \$ 41.95 | \$ 41.95 | \$ 54.95 | \$ 64.95 | \$ 84.95 | n/a | \$ 57.75 |
| | Difference (%) | 3.41% | -5.52% | -11.94% | -7.74% | 7.90% | n/a | -2.61% |
| Toronto | Incumbents | \$ 42.17 | \$ 51.50 | \$ 80.00 | \$ 90.00 | \$ 110.00 | \$ 255.00 | \$ 74.73 |
| | New Entrant | \$ 25.00 | \$ 25.00 | \$ 35.00 | \$ 35.00 | \$ 50.00 | n/a | \$ 34.00 |
| | Difference (%) | -40.71% | -51.46% | -56.25% | -61.11% | -54.55% | n/a | -54.50% |
| Vancouver | Incumbents | \$ 42.17 | \$ 51.50 | \$ 80.00 | \$ 90.00 | \$ 110.00 | \$ 255.00 | \$ 74.73 |
| | New Entrant | \$ 25.00 | \$ 25.00 | \$ 35.00 | \$ 35.00 | \$ 50.00 | n/a | \$ 34.00 |
| | Difference (%) | -40.71% | -51.46% | -56.25% | -61.11% | -54.55% | n/a | -54.50% |
| Average (Level) | Incumbents | \$ 40.92 | \$ 49.04 | \$ 74.87 | \$ 84.37 | \$ 101.87 | \$ 252.10 | \$ 77.72 |
| | New Entrant | \$ 30.63 | \$ 34.38 | \$ 48.88 | \$ 53.88 | \$ 73.88 | \$ 220.55 | \$ 54.70 |
| | Difference (%) | -25.15% | -29.91% | -34.72% | -36.15% | -27.48% | -12.51% | -29.62% |

No New Entrant was found in the other two cities: Winnipeg and Regina.
Only one New Entrant was found in the above four cities - Eastlink (Halifax), Videotron (Montreal), Wind (Toronto and Vancouver).
Telus, Rogers and Bell offer same price plan for Vancouver and Toronto.
New entrant prices for Level 6 were available for Halifax. Therefore, Level 6 average reflect prices for Halifax only.
Incumbents' prices represent the unweighted averages.
If new entrant price was not available for a city, it was not included in the city average.
If new entrant price was not available for a service level, it was not included in the level average.

²² New entrant prices were not available for Montreal, Toronto and Vancouver for Level 1 and for Toronto and Vancouver for Level 3. For comparison purposes next level prices were included i.e. Level 2 prices for Level 1 and Level 4 prices for Level 3.

Overall, new entrants' prices were lower than the incumbents' by a range of 25% to 36% for service basket Levels 1, 2, 3, 4 and 5. On average, the price differential decreased from last year, except for Level 2. For example, 29% versus 25% (Level 1), 37% versus 35% (Level 3), 38% versus 36% (Level 4) and 50% versus 27% (Level 5). For Level 2, the difference increased from 26% to 30%.²³

4.2.2 Comparison of Incumbents and Incumbent Flanker Brand Prices

This section further expands the analysis by including incumbents' flanker brands such as Fido (Rogers), Chatr (Rogers), Mobilicity (Rogers), Virgin (Bell), Public Mobile (TELUS) and Koodo (TELUS). Chatr is only available in three cities (Montreal, Toronto and Vancouver), and Mobilicity was only available in Toronto and Vancouver. Table 8 below, provides a summary of the price comparison between incumbents versus flanker brands and flanker brands versus new entrants for service baskets Level 1 to 5. Flanker brand price plans for service Level 6 (family basket) were not found, and are therefore not included in the following comparison.

Overall, flanker prices are 14% lower than those of incumbents and new entrants' prices were 20% lower than those of flanker brands. In Halifax, on average, there was no price difference between the flanker brands and the new entrants. However, for the higher Levels 3 to 5, new entrants' prices were higher than those of the flanker brands. Similarly, in Montreal new entrants' prices were higher relative to flanker brands. In all other cases, new entrants' prices were lower than those of flanker brands.

Table 8: Mobile Wireless Price Comparison - Incumbent versus Flanker and Flanker versus New Entrant

| City | Service Provider Type | Mobile Wireless Service Basket Level | | | | | Average (City) |
|-----------|------------------------|--------------------------------------|----------|----------|----------|-----------|----------------|
| | | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | |
| Halifax | Incumbents (I) | \$ 38.76 | \$ 48.76 | \$ 77.10 | \$ 87.10 | \$ 108.76 | \$ 72.10 |
| | Flanker (F) | \$ 42.10 | \$ 50.10 | \$ 62.93 | \$ 77.93 | \$ 101.68 | \$ 66.95 |
| | New Entrant (N) | \$ 30.55 | \$ 45.55 | \$ 70.55 | \$ 80.55 | \$ 110.55 | \$ 67.55 |
| | Difference: (F) vs (I) | 8.60% | 2.73% | -18.38% | -10.52% | -6.51% | -7.14% |
| | Difference: (N) vs (F) | -27.43% | -9.08% | 12.11% | 3.36% | 8.72% | 0.90% |
| Montreal | Incumbents (I) | \$ 40.57 | \$ 44.40 | \$ 62.40 | \$ 70.40 | \$ 78.73 | \$ 59.30 |
| | Flanker (F) | \$ 36.14 | \$ 41.26 | \$ 51.24 | \$ 64.24 | \$ 77.80 | \$ 54.14 |
| | New Entrant (N) | \$ 41.95 | \$ 41.95 | \$ 54.95 | \$ 64.95 | \$ 84.95 | \$ 57.75 |
| | Difference: (F) vs (I) | -10.92% | -7.07% | -17.88% | -8.75% | -1.19% | -8.71% |
| | Difference: (N) vs (F) | 16.08% | 1.67% | 7.24% | 1.11% | 9.19% | 6.68% |
| Toronto | Incumbents (I) | \$ 42.17 | \$ 51.50 | \$ 80.00 | \$ 90.00 | \$ 110.00 | \$ 74.73 |
| | Flanker (F) | \$ 36.20 | \$ 43.40 | \$ 60.24 | \$ 73.86 | \$ 89.76 | \$ 60.69 |
| | New Entrant (N) | \$ 25.00 | \$ 25.00 | \$ 35.00 | \$ 35.00 | \$ 50.00 | \$ 34.00 |
| | Difference: (F) vs (I) | -14.15% | -15.73% | -24.70% | -17.94% | -18.40% | -18.79% |
| | Difference: (N) vs (F) | -30.94% | -42.40% | -41.90% | -52.61% | -44.30% | -43.98% |
| Vancouver | Incumbents (I) | \$ 42.17 | \$ 51.50 | \$ 80.00 | \$ 90.00 | \$ 110.00 | \$ 74.73 |
| | Flanker (F) | \$ 36.20 | \$ 43.40 | \$ 60.24 | \$ 73.86 | \$ 89.76 | \$ 60.69 |
| | New Entrant (N) | \$ 25.00 | \$ 25.00 | \$ 35.00 | \$ 35.00 | \$ 50.00 | \$ 34.00 |
| | Difference: (F) vs (I) | -14.15% | -15.73% | -24.70% | -17.94% | -18.40% | -18.79% |
| | Difference: (N) vs (F) | -30.94% | -42.40% | -41.90% | -52.61% | -44.30% | -43.98% |

²³ However, Level 5 new entrants' prices were higher in Halifax and Montreal.

| | | | | | | | |
|--------------------|------------------------|----------|----------|----------|----------|-----------|----------|
| Average (Level) | Incumbents (I) | \$ 40.92 | \$ 49.04 | \$ 74.87 | \$ 84.37 | \$ 101.87 | \$ 70.22 |
| | Flanker (F) | \$ 37.66 | \$ 44.54 | \$ 58.66 | \$ 72.47 | \$ 89.75 | \$ 60.62 |
| | New Entrant (N) | \$ 30.63 | \$ 34.38 | \$ 48.88 | \$ 53.88 | \$ 73.88 | \$ 48.33 |
| | Difference: (F) vs (I) | -7.96% | -9.18% | -21.65% | -14.11% | -11.90% | -13.67% |
| | Difference: (N) vs (F) | -18.68% | -22.82% | -16.69% | -25.66% | -17.69% | -20.28% |

No New Entrants were found in: Winnipeg and Regina and only one New Entrant was found in the following four cities - Eastlink (Halifax), Videotron (Montreal), Wind (Toronto and Vancouver).

Telus, Rogers and Bell offer the same price plans for Vancouver and Toronto.

Five flanker brands included Bell Virgin, Rogers Fido, Telus Koodo, Rogers Chatr, Mobilicity.

Incumbents' prices represent the unweighted averages.

If New Entrant prices was not available for a city, they were not included in the city average.

If New Entrant prices were not available for a service level, they were not included in the level average.

4.2.3 Comparison of Incumbent and Reseller or MVNO Prices

Table 9 provides a price comparison between incumbent and resellers/MVNOs by each service basket level. Consistent with previous year's Study, the prices reflect the national average based on the unweighted average in four cities (Halifax, Montreal, Toronto and Vancouver).

Table 9: Mobile Wireless Price Comparison - Incumbent versus Resellers/MVNOs

| Service Provider Type | Mobile Wireless Service Basket Level | | | | | |
|-----------------------|--------------------------------------|----------|----------|----------|-----------|-----------------|
| | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Average (Level) |
| Incumbents | \$ 40.92 | \$ 49.04 | \$ 74.87 | \$ 84.37 | \$ 101.87 | \$ 70.22 |
| Resellers/MVNO | \$ 26.98 | \$ 46.73 | \$ 64.21 | \$ 74.21 | \$ 104.21 | \$ 63.27 |
| Difference (%) | -34.06% | -4.71% | -14.25% | -12.05% | 2.29% | -9.90% |

No reseller/MVNO was found for Level 6 (Family Basket).

Resellers/MVNO include Primus, PC Mobile, Petro Canada Mobile and 7-Eleven-Speakout.

For service baskets level 3, 4 and 5 only one MVNO was found - PC Mobile.

Level 3 excludes two resellers/MVNOs due to abnormally high prices: Primus (\$115.62) and Petro-Canada (\$141.25).

Incumbents' and Resellers/MVNO prices represent their respective unweighted averages.

Surveyed resellers/MVNOs include Primus, PC Mobile, Petro-Canada Mobile, and 7-Eleven. Primus and Petro-Canada were excluded from the service basket Level 3 average due to their abnormally high prices (Primus: \$115.62 and Petro Canada Mobile: \$141.25). The inclusion of Primus' and Petro-Canada's prices in the resellers/MVNOs would have distorted the Level 3 average and made the survey results less representative. For Level 4 and 5, a price for only one reseller/MVNO (PC Mobile) was available.

Overall, the price differential between incumbents and resellers/MVNOs increased in comparison to last year. For example, the difference in Level 1 increased from -14% last year to -34% this year. For Level 4 the difference increased from -9% to -12%. Last year resellers/MVNOs prices were higher by 22% in the case of Level 5, as compared to 2% this year. In the case of Levels 2 and 3, the price difference decreased from -25% to -5% and -21% to -14%, respectively.

4.3 Mobile Wireless Term Contract versus Bring Your Own Device

This section examines Bring Your Own Device (BYOD) discounts and device financing approaches in the Canadian market.

Traditionally, Canadian wireless service providers offered a handset (device) at no cost or with a certain upfront cost for a fixed term contract. Pursuant to the Canadian Wireless Code, WSPs may collect a contract cancellation fee for a maximum period of 24 months. Accordingly, the service providers mostly offer the maximum 24-month term, although some also offer one-year terms.

In recent years, service providers have also offered consumers the option to bring their own device. With a BYOD option, consumers are not subject to a fixed contract term and many providers offer discounts on post-paid plans - ranging from approximately \$10.00 to \$15.00 per month. Pre-paid plans imply that the consumer is bringing their own device.

In general, the incumbents and their flanker brands primarily offer two pricing models for BYOD options. The first of these is based on device distinctions, whereby premium devices (such as iPhone 6s, Samsung Galaxy N5 – priced over \$700) are offered at a higher monthly rate than lite devices (such as a smartphone priced below \$400) on a post-paid plan. Meanwhile, post-paid plans that include a lite device are often offered at a higher or equal monthly rate to post-paid plans - available to consumers who bring their own device.

The second pricing model is referred to as a 'tab model' whereby consumers can select a smartphone of their choice and pay one of a number of monthly rates that cover the cost of the particular device in addition to plan costs. The lower the monthly rate consumers select, the higher the upfront cost of the device. In this case, consumers are often able to select from a range of up-front costs. Other providers offer consumers an additional discount per month based on a percentage of monthly plan cost.

Table E. 1 in Appendix E provides an overview of the BYOD versus Fixed Contract options offered by the Canadian wireless service providers. The comparison is based on two broad categories of devices: lite devices and premium devices. The offers by different service providers shown in the Table E.1 were selected from a range of different options advertised by the service providers. The selection was designed to fairly represent the two broad categories of the respective service provider.

Notable points, illustrated in Table E. 1 (Appendix E), include:

- **Lite Device:** The retail price of the device ranged between \$290 and \$350. No upfront fee or cost is paid by the consumer for a device covered under a fixed term contract, which is generally 24 months. In case of Incumbents (Bell, Rogers, MTS and SaskTel) the monthly rate with BYOD or without BYOD are the same.
- **Premium Device:** The most common device is the iPhone 6s which has a retail price of \$900+. Generally, an upfront fee of approximately \$400 (about 45% of retail price) is paid by the consumer who opts for a fixed term plan with a premium device. Most of the service providers offer a discount (commonly \$10 and \$15) on the monthly rate if a consumer opts for a BYOD option.

To understand the underlying economics, key questions raised (regarding BYOD versus fixed term plan options) from the perspective of both consumer and the service provider are:

- What is the cost of financing if consumer chooses fixed term (24 months) plan?
- To what extent are the service providers subsidizing the cost of device if a consumer chooses a fixed (24 months) plan?

For this analysis, scenarios included a premium device (iPhone 6s) and the following key factors:

- **Wholesale Price of Device:** Service providers normally make bulk purchases of devices, which allows them to realize a discounted wholesale price relative to retail price paid by a consumer. Based on

industry average, the bulk discount could range between 10% and 20%. We assumed 15% (midpoint) for this analysis.

- **Churn Rate:** When a consumer subscribes to a 24-month term, it helps reduce the service provider's churn rate. In a competitive environment, with the BYOD option, the consumer is free to switch from one service provider to another for best deals. Whereas, when a consumer is on a fixed term, he or she is likely to remain with the same service provider for the term period in order to avoid cancellation penalties. Churn results in higher ordering (service activation and cancellation) costs and dilution of the average revenue per unit (ARPU). Current average monthly churn rate ranges between 1.3% and 1.6%²⁴. We assumed a 1.5% monthly churn rate for this analysis.
- **Ordering Cost:** At a 1.5% monthly churn rate, the number of orders (activation and cancellation) are 2.5 times higher over a 24-month period than they would be if a consumer were on a 24 month fixed contract (0% churn). Thus, if the same consumer is on a month-to-month term and thus free to switch from one service provider to the other, the service provider will need to add more consumers every month in order to maintain the same consumer base as it would be without churn. As a result, the service provider will have relatively higher order volumes. Based on a 1.5% monthly churn rate, the order volume is estimated to be 2.5 times higher. According to our research, a service activation plus cancellation cost to a typical service provider is about \$100 per order. In this scenario, the service provider can save about $\$100 \times 2.5 = \250 in case of a 24-month contract consumer relative to a month-to-month consumer.
- **ARPU and Consumer Base Protection:** ARPU dilution is the second implication of higher churn rate. There are two reasons:
 - In a competitive environment, the service provider has to make promotional offers to attract new consumers, which translates to lower ARPU rate; and
 - With a higher churn rate, the *average-in-service* (AIS) consumer base decreases, if not offset by new activations. This results in lower total revenue. For major Canadian wireless service providers, the current ARPU is \$62 and the earnings before interest, taxes, depreciation and amortization (EBITDA) margin, 40.6%²⁵, or net margin of \$25 (= $\$62 \times 40.6\%$). Based on \$25 margin and 1.5% monthly churn, we estimated that service providers can increase their per consumer EBITDA margin by \$92 over a 24-month fixed contract term scenario.
- **Monthly Savings:** In certain cases, the consumer can save \$10 - \$15 per month with a BYOD option. For this analysis, we considered the mid-point of \$12.50 per month and calculated its present value (worth) based on 24-month period, using a 2-year risk free bond yield, which is estimated to be 1.5% per annum.
- **Upfront Fee:** Service providers typically charge consumers an upfront fee of \$400 for a premium device. This was the cost considered in this analysis.

Based on the six factors discussed above, Table 10, below, provides a summary of the comparison between a BYOD option versus a Fixed Term Contract, providing the perspectives of both the consumer and service provider.

²⁴ 2015 CRTC Communications Monitoring Report (page 229).

²⁵ 2015 CRTC Communications Monitoring Report (page 229 for ARPU and page 143 for EBITDA Margins).

Table 10: BYOD versus 2-Year Contract Option Analysis

| Option Considerations | Consumer Perspective | Service Provider (SP) Perspective | Remarks |
|--------------------------------------|----------------------|-----------------------------------|-------------------------------------|
| A: 24 Month Fixed Term Option | | | |
| Device Price (iPhone 6s) | - | \$ 777.75 | SP buys at 15% discount (wholesale) |
| Upfront Fee paid by consumer | \$ 400.00 | (\$ 400.00) | Upfront fee paid by consumer |
| Net Cost (24 Month Fixed Term) | \$ 400.00 | \$ 377.75 | |
| B: BYOD | | | |
| Device Price (iPhone 6s) | \$ 915.00 | - | Consumer buys at retail price |
| Monthly Plan Savings / discount | (\$ 295.36) | \$ 295.36 | Present worth of \$12.5 per month |
| Additional Ordering Cost | - | \$ 250.00 | Based on 1.5% monthly churn |
| Net Revenue Loss | - | \$ 91.70 | Based on 1.5% monthly churn |
| Net Cost (BYOD) | \$ 619.64 | \$ 637.06 | |
| Cost Difference (A minus B) | (\$ 219.64) | (\$ 259.31) | 24 Month Plan versus BYOD |
| <i>Difference (%)</i> | <i>(54.91%)</i> | <i>(68.65%)</i> | |

According to the above analysis, BYOD appears to be more expensive from the perspective of both the service providers and the consumer. The consumer's cost differential is 55%, which may reduce to break-even depending upon the amount of upfront fees and discounts that are charged on the consumer's monthly rate plan. The service provider's cost differential is slightly higher (69%). For service providers, the critical factors include the effect on monthly churn and its financial impacts in terms of ordering costs and revenues. Our analysis also indicates that with a 24-month contract term, both the consumer and service provider almost equally share the cost of the device (\$400 versus \$378), which may vary depending on the amount of upfront fee paid by the operator.

This analysis does not account for qualitative factors such as brand loyalty, quality of customer service, flexibility and the variety of choices that may be available to a consumer with or without BYOD option. It is pertinent to note that many consumers may not opt to purchase a new device in lieu of reusing an older device.

4.4 International Mobile Wireless Telephony

As noted in previous studies, there are a number of important pricing differences that should be considered when comparing Canadian and foreign Mobile Wireless Telephony prices.

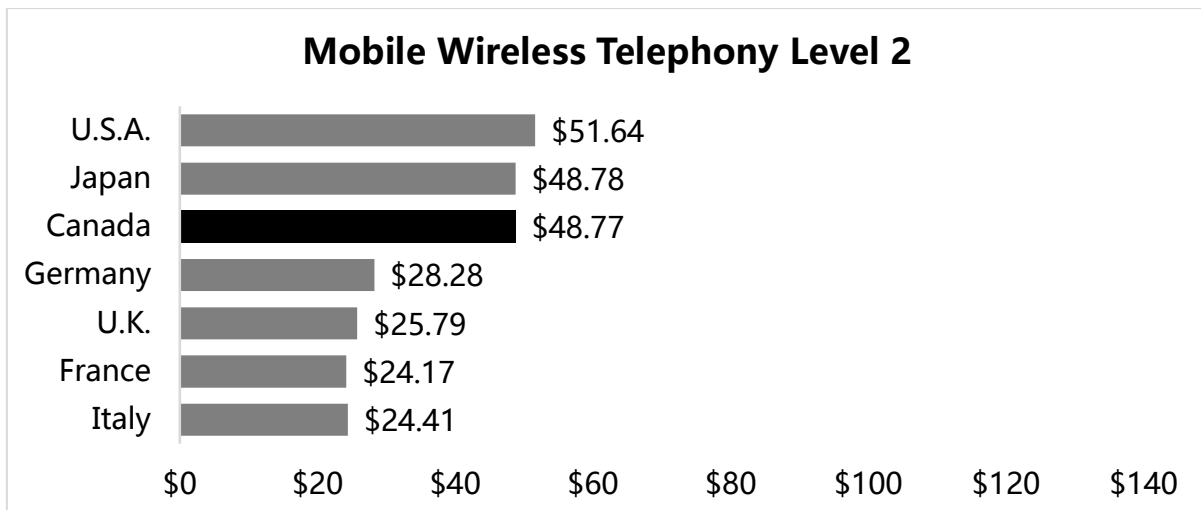
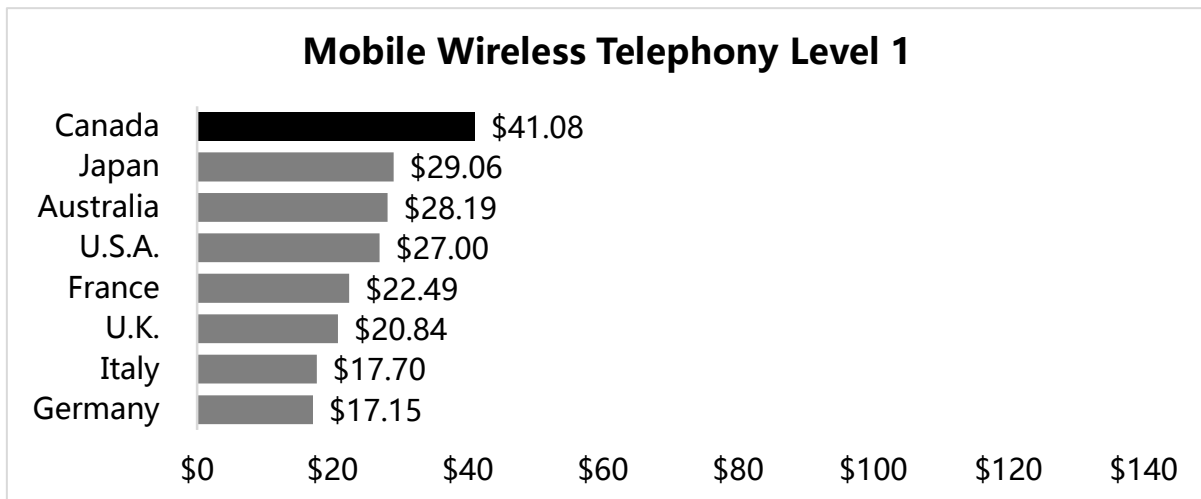
- **Price Structure:** The pricing of Mobile Wireless Telephony service plans in the UK, Germany, Italy, France, Australia and Japan differ significantly as compared to Canada (as well as the US). Mobile Wireless Telephony prices in Europe, Australia and Japan are set on a 'calling party pays' (CPP) basis, where consumers pay only for outgoing calls. On the other hand, Canadian and US pricing plans are based on a 'receiving party pays' (RPP) approach, under which consumers pay for incoming and outgoing calls. Unlike Canada and the US, some Mobile Wireless Telephony service plans in Europe, Australia and Japan also include per-call setup charges and/or different per-minute call rates to landline versus to mobile consumers, and/or as potentially different per-minute rates for on-net versus off-net mobile calls. However, as in Canada, unlimited national calling plans and service add-ons that cover calls to both fixed and mobile devices and allow for both on and off-net mobile lines, are now commonly available.

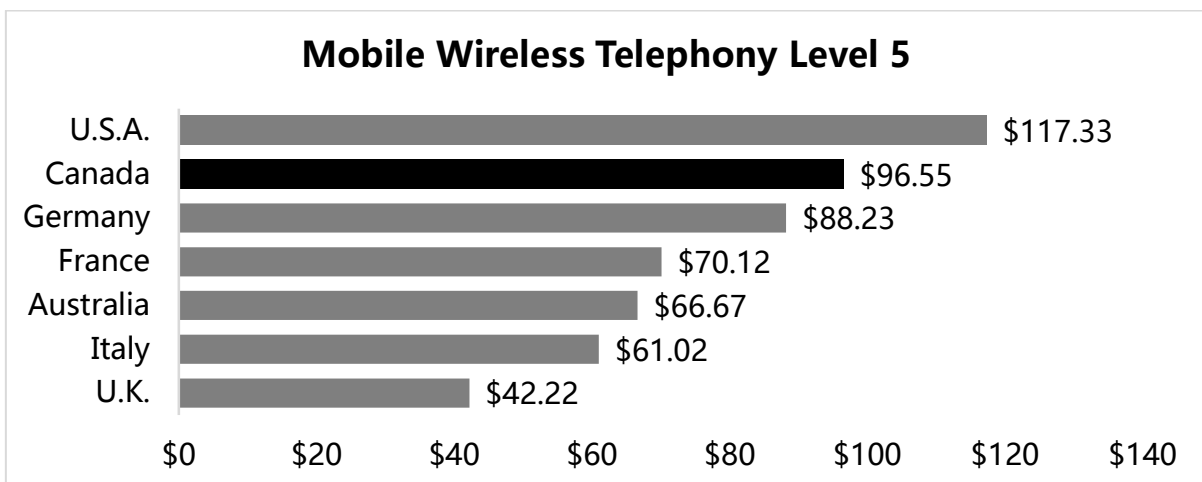
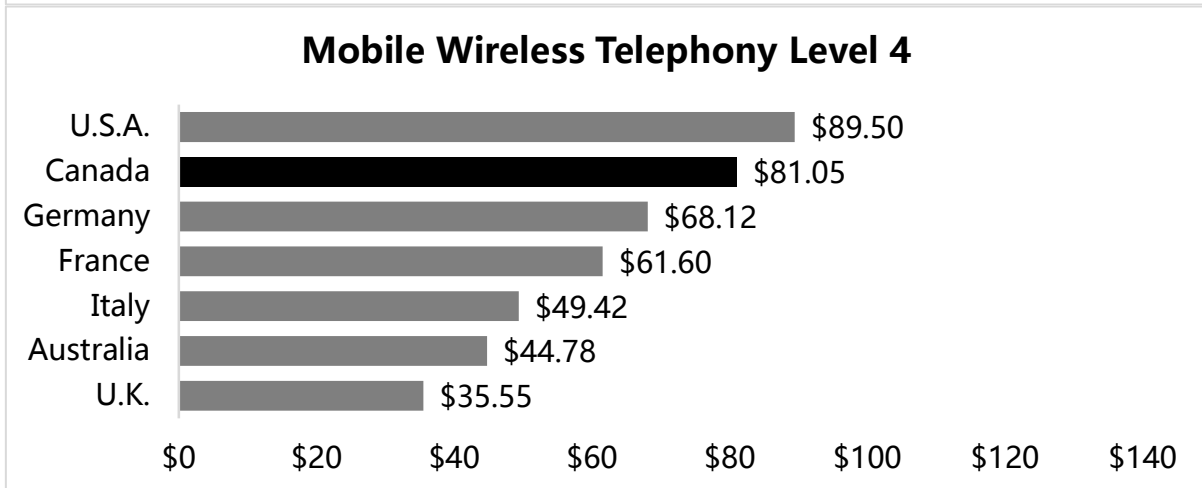
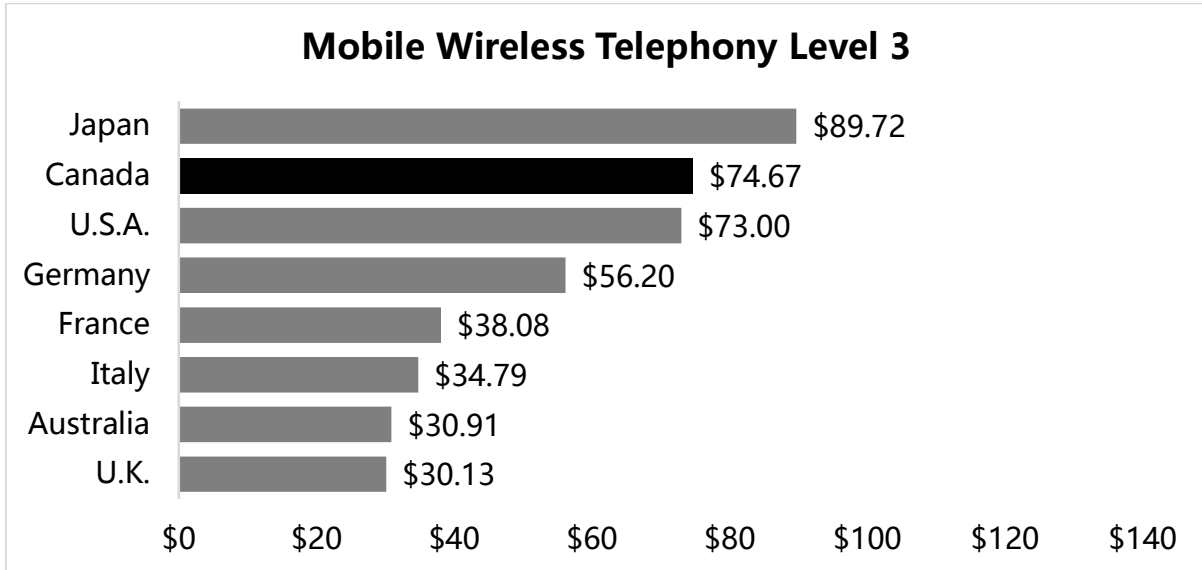
- **Regulatory Fees:** Regulatory fees of one form or another apply in Canada, Japan and the US. In Canada, there is typically an explicit emergency 9-1-1 fee and, in some cases, universal service fees (as in the case of Japan). In the US, there are a variety of regulatory fees, federal and state USF surcharges and other fees. For this year's Study, we have estimated these regulatory charges based on updated information on USF fees and carrier-specific regulatory cost recovery charges and, where applicable, information collected in previous pricing studies.

Figure 7 below, provides a comparison of current Mobile Wireless Telephony prices between Canada and the surveyed seven foreign jurisdictions for each of the six service baskets. All prices are expressed in PPP-adjusted Canadian dollars and exclude retail sales taxes.

Canadian Mobile Wireless Telephony prices are, on average, higher than those in other international jurisdictions. For example, Canadian average prices are the highest for Level 1, the second highest for Levels 3-6 and the third highest for Level 2. The UK ranked lowest in Levels 3-6, Germany in Level 1 and Italy in Level 2.

Figure 7: 2016 International Mobile Wireless Telephony Price Comparison PPP-adjusted CD





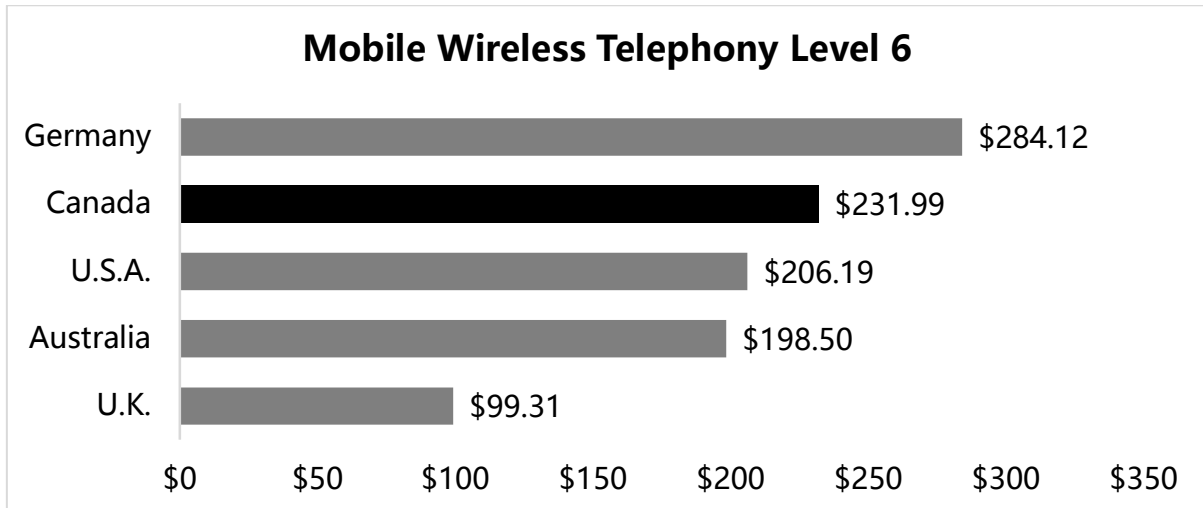
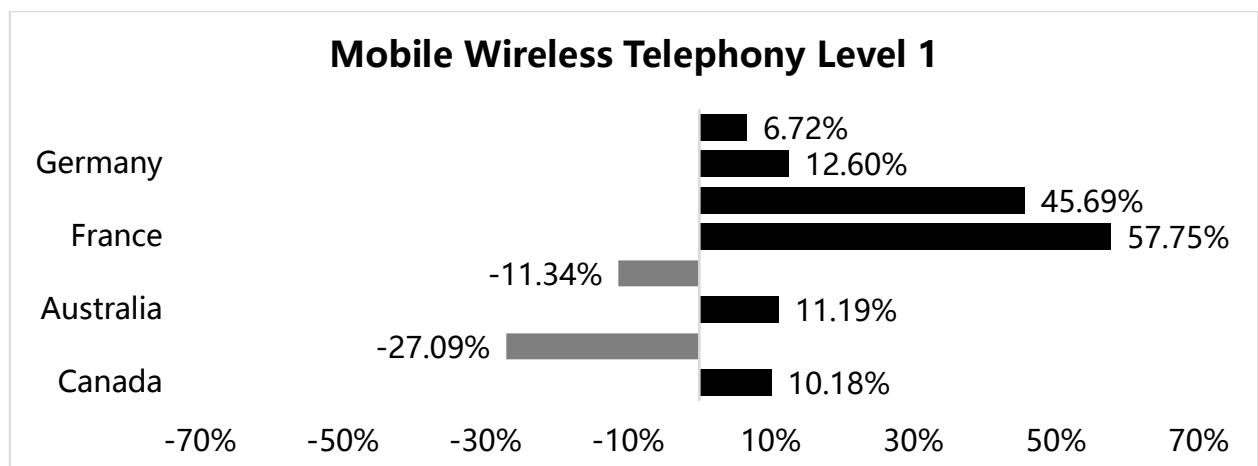
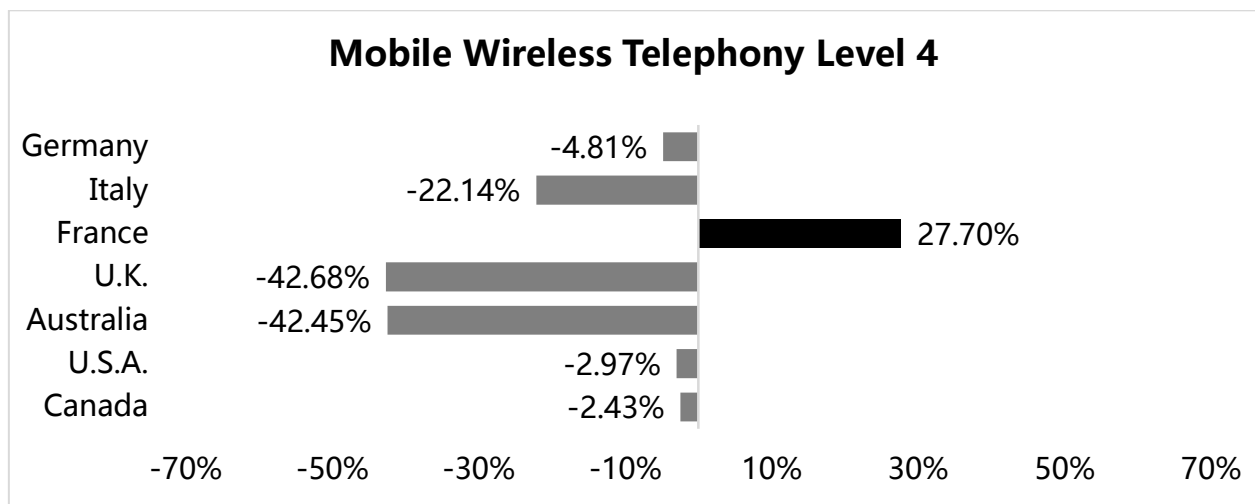
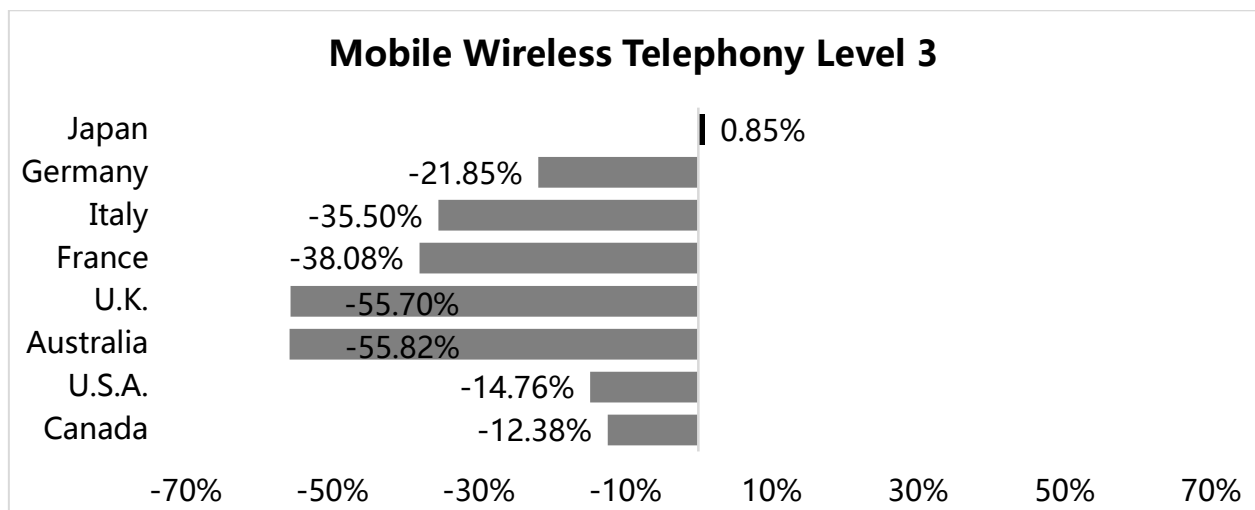
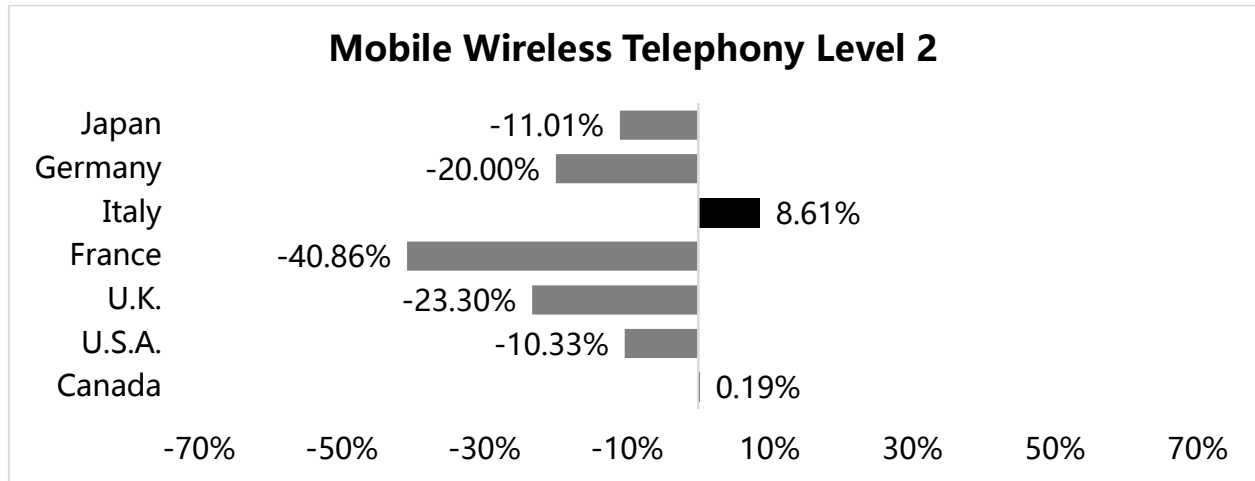


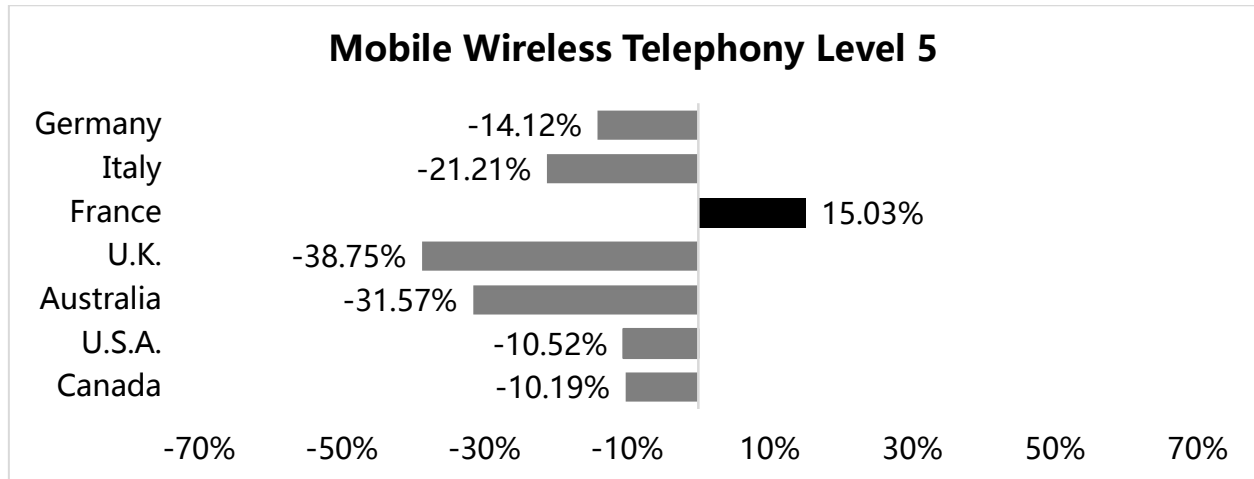
Figure D. 2 and Table D. 2, in Appendix D, provide a detailed historical account of international Mobile Wireless prices for the period of 2008 to 2016 for each country and basket, as applicable.

Figure 8 below, provides an overview of the changes in the international Mobile Wireless prices since last year. All countries - except France (Levels 1, 4 and 5), Japan (Level 1 and 3), Italy, Germany, Australia (Level 1), showed a decrease in prices over the past year. The greatest price movement was in Level 3 prices ranging between -12.4% (Canada) and -55.8% (Australia). For Levels 4 and 5, the most significant decrease was in Australia and the UK. Canadian prices also decreased for service baskets 2, 4, and 5, but at a relatively low rate.

Figure 8: Year-over-Year (YoY) Change in International Mobile Wireless Telephony Prices (2015-2016)







4.5 Summary of Price Changes in Mobile Wireless Telephony

In this section, we summarize the reasons for the year-over-year price changes in the Mobile Wireless Telephony service baskets, both in Canada and internationally. This year's Study was based on post-paid service plans. However, pre-paid plans were included in the comparison if there were no post-paid plans offered by a service provider within a particular service basket. This approach was based on the following factors:

- Post-paid plans, particularly in Canada, are a far greater source of revenue for service operators than their pre-paid counterparts. The Commission's 2015 Communication Monitoring Report indicates that post-paid revenues neared \$17.2 billion while pre-paid revenues were close to \$877.3 million. The magnitude of this difference suggests they are the preferred option for Canadian consumers.
- Post-paid plans carry with them an implicit device cost. The vast majority of post-paid plans are on a contract term with a device discount - in contrast to pre-paid plans that are inherently no term with a BYOD implication.
- The previous years' Studies included the most popular premium devices such as iPhone 6. In this year's Study, the methodology was modified to include the least expensive lite device available from each service operator. In some cases, this change in methodology resulted in a sharp decrease in prices as the service providers' implicit device costs decreased significantly. This can be seen in the price decreases in Level 2 to Level 5 service baskets, for both Canadian and international prices.
- It is pertinent to note that the Canadian incumbents increased prices by \$5.00 across a number of plans in Level 3 to 6 services baskets in January 2016. However, a year-over-year comparison showed these plan prices actually decreased by \$5.00. This decrease reflects the difference in price between incumbents' plans including a lite device and those including a premium device. As aforementioned, last year's Study opted for premium device plans whereas this year's Study opted for lite device plans. This distinction also played a part in some price fluctuations in the international jurisdictions. For instance, the UK experienced some of the most severe price decreases within Level 2 to Level 5 service baskets. This can be accounted for by the high implicit device cost built into the monthly plan prices selected in the previous year's Study. For example, in March 2016, a consumer selecting an identical plan from Virgin Mobile in the UK can opt to pay £32.00 per month for a plan including an iPhone 6s or £10.00 per month for a plan including a Samsung Galaxy Core Prime.
- Finally, changes in market shares relative to the previous year's Study also had an impact on particular Canadian cities' overall average price. For example, MTS in Winnipeg, captured nearly 50% of Manitoba's mobile wireless market share. This year, MTS's post-paid plan for the Level 1 service basket is \$40.00 per month, relative to the \$30.00 plan included last year. In light of MTS's currently

offered plans, it appears as though the \$30.00 plan selected last year was pre-paid. Due to MTS's significant market share, the \$10.00 difference was a major contributing factor in the average price increase in Winnipeg's Mobile Wireless Telephony Level 1 service basket.

4.6 Canada-US Roaming Prices

To provide an overview of the roaming costs for a Canadian visiting the US and vice versa, rates for voice, text and data roaming were also collected in the survey. The survey included Canadian incumbents, incumbent flanker brands and new entrants who provide US roaming services. Likewise, US incumbents offering roaming services in Canada were also included. There is a wide range of roaming options offered by Canadian as well as US service providers. To ensure consistency with the previous year's Study, this analysis was limited to the two most common roaming options for voice, text and data: (a) Pay-As-You-Go rates and (b) Stand-alone Add-on package.

Table 11 below, provides the comparison of the Pay-As-You-Go option. With respect to the pricing of the Canadian incumbents and flanker brands²⁶, the roaming rates have declined on a year-over-year basis. For example, voice roaming rates declined from \$1.49 to \$1.20 (incumbents) and \$1.23 to \$1.02 (flanker). Similar trends were found for text and data in the case of the US incumbents. Canadian resellers' voice, text and data prices were not included in the previous year's Study.

In the case of the US incumbents, rates also decreased for voice, text and data. Overall, the two countries show a decreasing trend in Pay-As-You-Go roaming rates.

Table 11: Base Pay-As-You-Go Roaming Rates

| Services | Canadian Carriers | | | | US Carriers |
|--|-------------------|----------|--------------|-----------|-------------|
| | Incumbents | Flankers | New Entrants | Resellers | Incumbents |
| Voice (per minute) | \$1.20 | \$1.02 | \$0.32 | \$1.48 | \$1.08 |
| Text (per text) | \$0.61 | \$0.44 | \$0.23 | \$0.68 | \$0.41 |
| Data (per MB) | \$3.52 | \$3.75 | \$0.40 | \$3.00 | \$5.51 |
| The above roaming rates are Pay-As-You-Go. | | | | | |
| Canadian Carriers' roaming rates (in Canadian \$s) are for their customers while in the US. | | | | | |
| US Carriers' roaming rates (in PPP-adjusted Canadian \$s) are for their customers while in Canada. | | | | | |

Table 12 below, provides a comparison of Stand-alone Add-on roaming rates between Canadian and US service providers. US implicit voice rates slightly increased (from \$0.27 to \$0.31 per minute) and implicit data rates increased (from 0.52 to 0.74 per MB). In the case of Canadian carriers, the incumbent's implicit voice and text rates have increased in the past year. For example, voice per minute increased from \$0.44 to \$0.63 and text message from \$0.10 to \$0.14 per text. However, Canadian carrier data rates significantly decreased from \$0.71 to only \$0.11 per MB.

²⁶ With respect to the incumbents and flanker brands, it is pertinent to note that although this Study considers them as two separate entities they are owned and operated by the incumbents.

Table 12: Add-on Roaming Package Stand-Alone and Bundles Roaming Rates

| Services | Canadian Carriers | | | U.S. Carriers |
|--|-------------------|----------|--------------|---------------|
| | Incumbents | Flankers | New Entrants | Incumbents |
| Average Add-on Package Price: | | | | |
| Stand-alone Voice Add-on | \$25.00 | \$12.50 | \$20.00 | \$6.82 |
| Stand-alone Text Add-on | \$7.00 | \$11.67 | \$15.00 | n/a |
| Stand-alone Data Add-on | \$12.50 | \$7.50 | \$20.00 | \$40.97 |
| Implicit Usage Price: | | | | |
| Voice (per minute) | \$0.63 | \$0.20 | \$0.20 | \$0.31 |
| Text (per text) | \$0.14 | \$0.03 | \$0.03 | n/a |
| Data (per MB) | \$0.11 | \$0.23 | \$0.20 | \$0.74 |
| <p>The above are unweighted average of the lowest cost stand-alone add-on package offered by the carriers. Canadian Carriers' roaming rates (in Canadian \$s) are for their customers while in the US. US Carriers' roaming rates (in PPP-adjusted Canadian \$s) are for their customers while in Canada. Implicit prices are per minute rate based add-on package price divided by the corresponding usage allowance, as applicable.</p> | | | | |

The three major Canadian incumbents recently introduced unlimited rates on a daily basis, specifically targeting travelers. The details are provided in Table 13 below:

Table 13: Canadian Unlimited US Roaming - Daily Package

| Daily Package | Rogers | Bell | TELUS |
|----------------------------|-----------|---------------|--------------|
| Plan Name | New Plan | Roam Better | US Easy Roam |
| Price | \$ 5.00 | \$ 5.00 | \$ 7.00 |
| Voice | Unlimited | 1000 | Plan cap |
| Text | Unlimited | Unlimited | Plan cap |
| Data Allowance (MB) | Plan Cap | 100 MB | Plan cap |
| Data Overage Rate (per/MB) | Plan Cap | Plan restarts | \$5.00 |

5. Fixed Broadband Internet Service

5.1 Fixed Broadband Internet Service Baskets

This year's Study includes the following five Fixed Broadband Internet service baskets:

- **Level 1:** Speed: 'basic' Internet service with advertised download speeds²⁷ of 3 to 9 Mbps²⁸.
Data usage per month: 10 GB.
- **Level 2:** Speed: 'average' (Canadian) high-speed Internet service with advertised download speeds of 10 to 15 Mbps.²⁹
Data usage per month: 50 GB.
- **Level 3:** Speed: high-speed Internet service with advertised download speeds of 16 to 40 Mbps
Data usage per month: 100 GB.
- **Level 4:** Speed: high-speed Internet service with advertised download speeds of 41 to 100 Mbps range.
Data usage per month: 150 GB.
- **Level 5:** Speed: high-speed Internet service with advertised download speeds of over 100 Mbps (targeted speed in the 100-1,000 Mbps range).
Data usage per month: 500 GB.

In the 2015 Study, the Level 1 service basket represented < 3 Mbps prices. However, this service basket has been updated to reflect more common basic level service offerings currently available in the market. In 2016, only service providers in two cities (Halifax and Regina) currently advertise plans that offer <3 Mbps download speed. With the current market trends it can reasonably be assumed that there will not be a significant demand for <3 Mbps service in the future in the six major Canadian cities. In light of these trends, for the purposes of the current Study, Level 1 was redefined to represent prices for service speeds of equal to, or exceeding 3 Mbps and less than or equal to 9 Mbps.

The market trend also indicated that many Fixed Broadband Internet service providers in Canada (e.g. Bell, Eastlink, Videotron), as well as abroad, offer download speeds of more than 100 Mbps³⁰, with a data usage limit of 500 GB. In certain cities such as Toronto as well as in the metro areas of the US, and the other 6 foreign jurisdictions, download speeds of up to 1GB are also available. Therefore, the new service basket Level 5 has been added to this Study to represent prices for service speed over 100 Mbps.

²⁷ It should be noted that 'advertised' speeds can differ from 'actual' speeds for a variety of reasons and that the range of any such differences can vary by technology and geographic location. For the purpose of this Study, any such variations are assumed to be roughly equal on a relative basis across the broadband services included in this Study.

²⁸ According to the CRTC 2015 CMR report, "...the percentage of Canadians with access to the 5 Mbps downstream speed has grown from 86% to 96%, with 77% of households actually subscribing to services offering this speed." (pp. 10).

²⁹ The CRTC 2015 CMR report indicates that roughly 55% Canadian subscribed to fixed broadband Internet services with downstream speed between 10 Mbps to 15 Mbps in 2014. (Table 2.0.0, pp. 23).

³⁰ According to the CRTC's Communications Monitoring Report 2015, broadband platforms at speeds of more than 100 Mbps are available to nearly 70% of Canadian households (page 209).

The changes in service definition of each basket level since 2010 are summarized as follows:

Table 14: Summary of Fixed Broadband Internet Service Baskets

| Basket | 2010 | 2011 | 2012 - 2015 | 2016 |
|---------|--------------|--------------|--------------|---------------|
| Level 1 | < 1.5 Mbps | < 1.5 Mbps | < 3 Mbps | 3 - 9 Mbps |
| Level 2 | 2 - 9 Mbps | 2 - 9 Mbps | 4 - 15 Mbps | 10 - 15 Mbps |
| Level 3 | 10 - 19 Mbps | 10 - 19 Mbps | 16 - 40 Mbps | 16 - 40 Mbps |
| Level 4 | - | > 20 Mbps | > 40 Mbps | 41 - 100 Mbps |
| Level 5 | - | - | - | > 100 Mbps |

Consistent with last year's Study, this year's Study takes into account the modem rental fees as part of the price data for Fixed Broadband Internet service baskets in light of the fact that these rental fees are often mandatory. In other cases, where consumers are required to purchase a modem, it is assumed that the cost of the modem is amortized over 24 months. However, one-time installation or activation fees are excluded.

As noted in previous year's Study, some ISPs apply data caps to their Fixed Broadband Internet plans. These caps are generally applied on a monthly usage basis (GB/month), and overage fees are charged (\$/GB) for any additional data usage. Amongst the ISPs surveyed for this Study, only those in Canada, Australia and the US apply data caps, whereas none of the ISPs surveyed in Japan, Italy, France, Germany and the UK applied data caps.

In addition, for each of the Fixed Broadband Internet service baskets, plans with the lowest advertised rates that fulfill the data usage assumptions adopted for the defined service baskets were selected.

5.2 Canadian Fixed Broadband Internet Service Prices

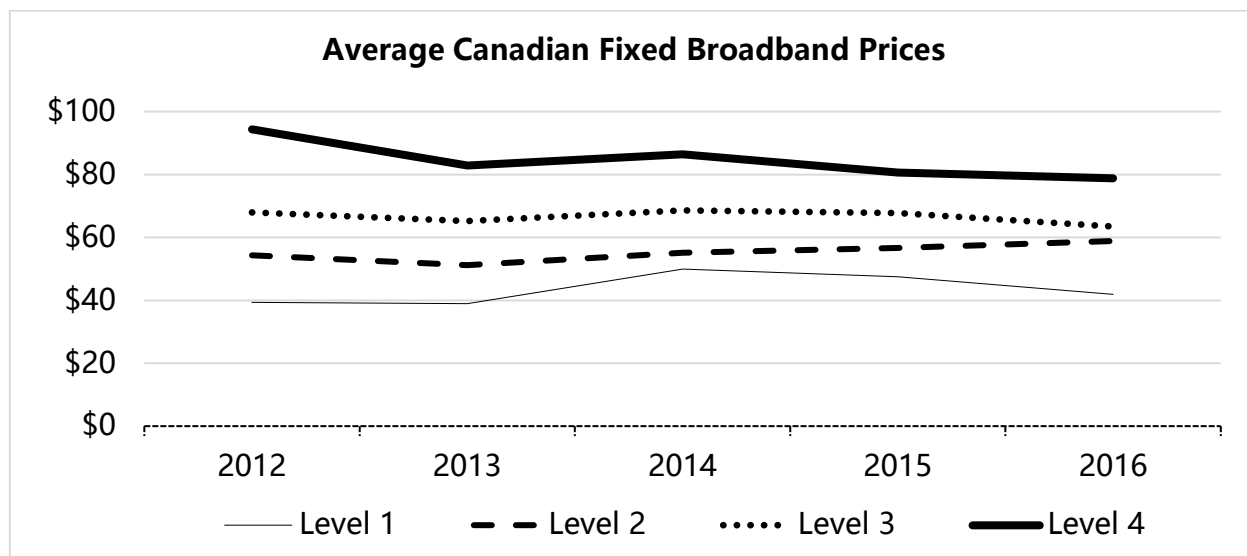
Figure 9 below provides an overview of the average price trend (2011-16) for Levels 1 to 4 of the Fixed Broadband Internet services in Canada³¹.

The key trends are:

- Canadian Fixed Broadband Internet service prices generally decreased over the past year. For example, there was a decrease in prices of 11.7% (Level 1), 6.4% (Level 3), and 2.3% (Level 4). Level 2 prices show an increase of 3.9%, which is mainly due to the fact that in this Study, Level 2 represented minimum prices for service speed of 10Mbps – 15Mbps in comparison to last year's data (4 Mbps - 15 Mbps).
- Over the 2008-2016 period, the Compound Annual Growth Rate (CAGR) for Level 1, 2 and 4 were 3.1%, 3.0% and 0.3%, respectively. However, these increases mainly reflect 2012 major revision in service levels. That is, in 2012 Level 1 definition was revised from <1.5 Mbps to <3 Mbps, Level 2 from "2 Mbps – 9 Mbps" to "4 Mbps – 15 Mbps", Level 3 from "10 Mbps – 19 Mbps" to "16 Mbps to 40 Mbps", and Level 4 from >20 Mbps to > 40 Mbps.
- Montreal prices were the lowest in Levels 2-4, and Toronto prices were the lowest in Levels 1 and 5.

³¹ Since Level 5 has been introduced this year the Figure 9 does not show its prices.

Figure 9: Average Price Trend of Fixed Broadband Internet Service Baskets in Canada for the period 2011-2016³²



- Level 1: In comparison to 2015, the average price for Level 1 in 2016 showed a significant decrease of 11.7%. It is pertinent to note that the 2016 price reflects a revised service basket definition (3 to 9 Mbps) as compared to that of 2015 (< 3 Mbps). Due to a revision in service basket definition, the average price in Halifax increased from \$55.13 to \$88.73. In the other five major Canadian cities, Level 1 average price ranged between \$33.63 (Toronto) to \$55.80 (Winnipeg). Based on the previous year’s definition (< 3Mbps), the 2015 prices for this service basket were available for only two cities, Halifax (\$55.13) and Regina (\$34.10). It should be noted that under the revised definition of service basket, there was a significantly higher price average in Halifax. The higher price was driven by the \$94.45 charged by Bell Aliant, with competition only from TekSavvy (\$45.08). Given multiple revisions in this service basket since 2008, the CAGR percentages (Halifax 12.4%, Montreal 3%, Toronto 1.8%, Winnipeg 8.1%, Regina 5.6%, and Vancouver 10.2%) should be read with the aforementioned caveats in mind.
- Level 2: The average price showed an increase of 3.9% from 2015 to 2016. Although the increase is consistent with that of the previous year (2.8%), the relatively higher rate of year-over-year increase is driven by the revision in the definition of service basket. That is, the 2016 price represents 10-15 Mbps prices, whereas 2015 represented 4 – 15 Mbps prices³³. With the revised definition, no service offerings met the Level 2 service basket definition in Halifax. For the other three cities, the prices in 2016 range from \$51.75 (Montreal) to \$62.60 (Winnipeg). For the same three cities the prices in 2015 ranged from \$52.88 (Regina) to \$59.90 (Vancouver). The CAGR over the period of 2008-2016, still shows an increasing trend in the prices for this service basket for all the Canadian cities captured in the survey: Montreal (0.7%), Regina (2.9%), Toronto (3%), Winnipeg (5.1%), Vancouver (5.3%), and Halifax (6.6%), over the period 2008-2016.
- Level 3: The average price for this Level showed a decrease of 6.4% from 2015 to 2016. There was no change in the definition of this service basket for this year. However, average prices for service basket (16 – 40 Mbps) were not found in Halifax, as this basket is currently not offered by any of the service providers surveyed. The 2016 prices range between \$56.09 (Montreal) to \$70.06 (Winnipeg)

³² The service baskets Level 1 and 2 definitions were revised in 2016 in order to reflect current market trends regarding the availability (demand) of fixed broadband Internet service in Canada. Previous years’ revisions are shown in Table 14. The price comparison should be observed with this information in mind.

³³ The lowest prices were selected if multiple price plans within a given service basket level were available for a surveyed fixed internet service provider.

compared to \$56.09 (Montreal) to \$65.20 (Toronto). Similar to 2015, the CAGR reflecting 2016 prices showed an increasing price trend in Winnipeg (3.7%), Regina (1.5%), Vancouver (3.9%) while Montreal (-4.8%), and Toronto (-1.6%) witnessed a decreasing trend.

- Level 4: This service basket was introduced in the 2011 Study. The average price showed a decrease of 2.3% in 2016 over 2015 in comparison to a 6.7% decrease in 2015 over 2014. The prices ranged between \$72.21 (Montreal) and \$89.90 (Winnipeg). For this service the CAGR decreased this year for Halifax (-0.1%), Montreal (-0.3%), Regina (-3.0%), and Vancouver (-0.5%). CAGR for the two cities showed an increasing trend: Toronto (0.8%) and Winnipeg (3.1%). Previous trend was: Halifax (4%), Montreal (0.4%), Toronto (2%), Winnipeg (n/a), Regina (1.4%), and Vancouver (-0.4%).
- Level 5: Introduced this year, the average prices by city for this service basket were: Halifax (\$133.10), Montreal (\$138.80), Toronto (\$92.91), Winnipeg (\$123.00), Regina (n/a), and Vancouver (\$123.00)

Figure C. 3 and Table C. 3 in Appendix C provide a more detailed historical overview of Canadian broadband Internet service price for the period 2008 to 2016 as applicable, for each of the five broadband service baskets.

5.2.1 Comparison of Incumbent and Reseller ISP Prices

While the previous section discussed the average prices of both incumbents and resellers, this section presents price differences between Canadian Fixed Broadband Internet incumbents and resellers. The resellers include Primus and TekSavvy.³⁴

Table 15 below, provides a summary of the differentials in the prices offered by the incumbents and the two resellers. This comparison is based on the minimum available prices offered by incumbents and resellers for each service basket level in each of the six major Canadian cities.

Table 15: Canadian Fixed Broadband Internet Prices – Incumbents versus Resellers

| Service Provider | Fixed Broadband Internet Service Basket | | | | |
|------------------|---|----------|----------|----------|-----------|
| | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
| Incumbent | \$ 52.89 | \$ 61.30 | \$ 62.78 | \$ 79.13 | \$ 112.47 |
| Reseller | \$ 34.05 | \$ 36.10 | \$ 44.64 | \$ 66.10 | n/a |
| Difference (%) | -35.61% | -41.11% | -28.89% | -16.47% | n/a |

Based on unweighted average of minimum incumbent's and reseller's price in each city.
Resellers include Primus and TekSavvy.

The price differential by each city is provided in Table C. 4 in Appendix C. Some of the key findings are:

- No resellers' service basket offerings were available in Regina and Winnipeg
- No resellers' service basket offerings for over 100 Mbps (Level 5 Service Basket) were available in Canada.

³⁴ These resellers rely on wholesale broadband access services (acquired from the incumbent telephone and cable companies) to provide retail broadband services.

- On average, the price differential was significantly higher in lower level service baskets. For example, there was a differential of 36% for Level 1, 41% for Level 2, 29% for Level 3 and only 16% for Level 4. This implies that resellers were not as competitive in higher-level baskets³⁵.
- One exception to the price differential trend noted above, was the price offered by a reseller in Vancouver for Level 4 basket – which was 7% higher than that of incumbent.

5.3 International Fixed Broadband Internet Service Prices

This section provides an international comparison of Fixed Broadband Internet prices offered by operators in each of the five service baskets. Figure 10 below provides an overview of the year over year changes (2015-2016) in average prices (Level 1 – 4).

Figure 10: Current Changes in International Fixed Broadband Internet Prices (2015-2016)

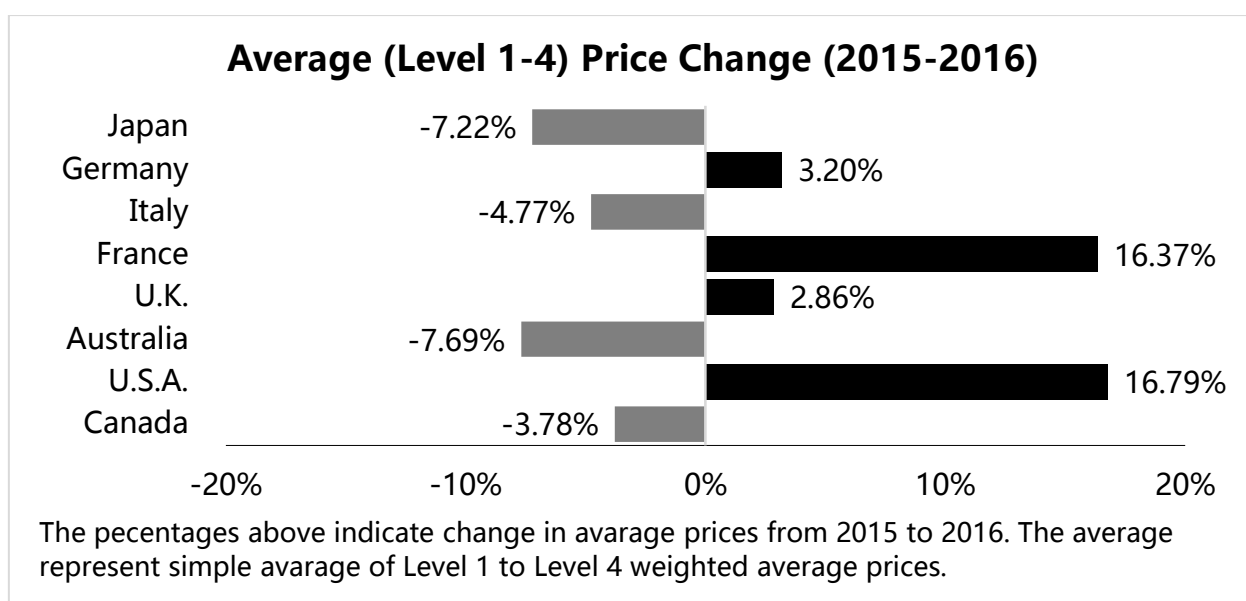
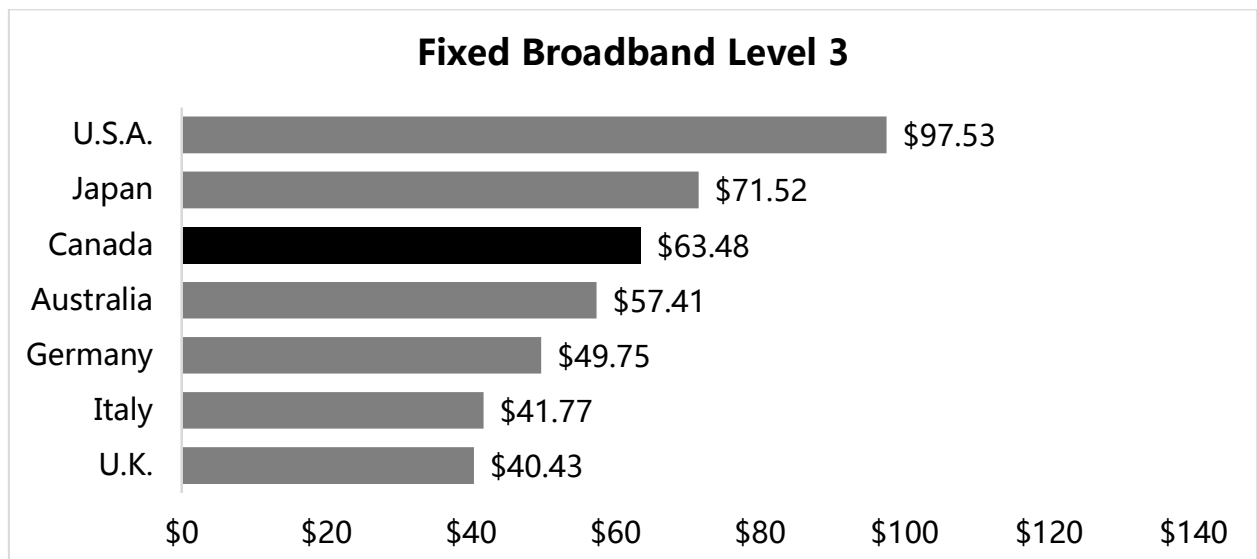
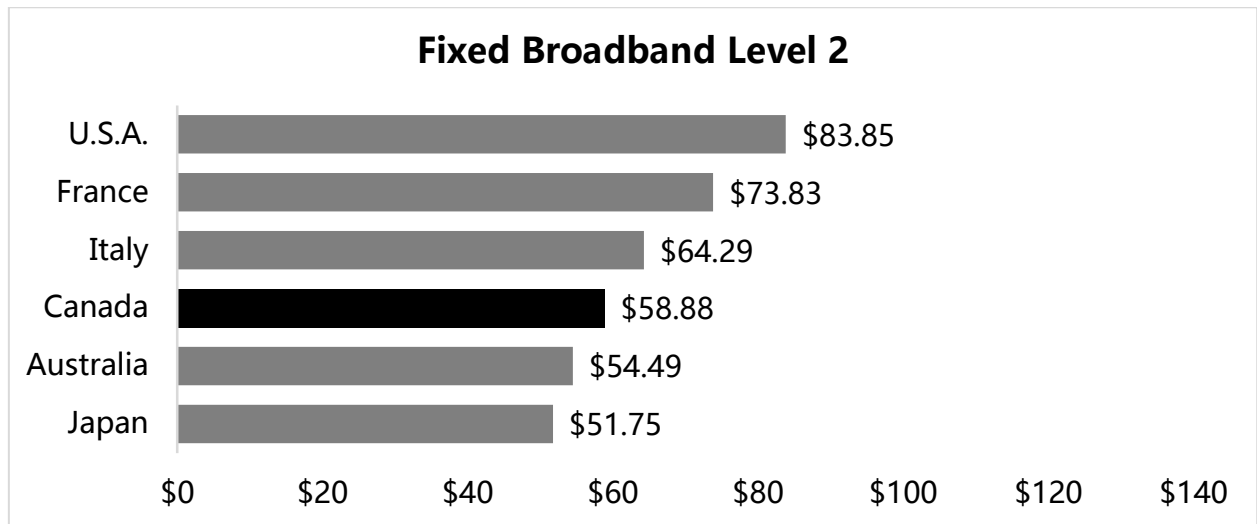
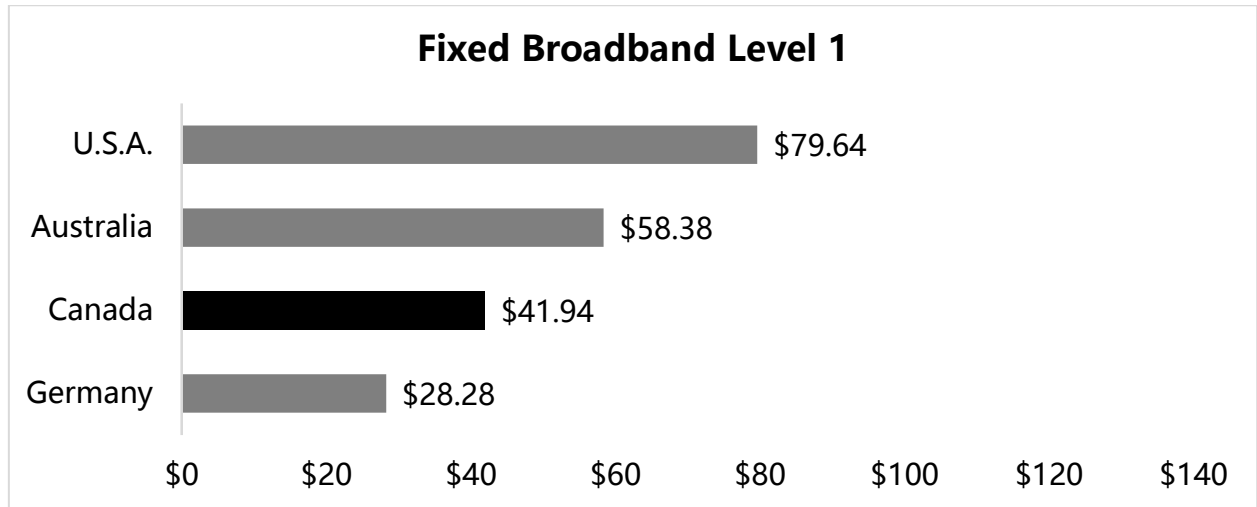


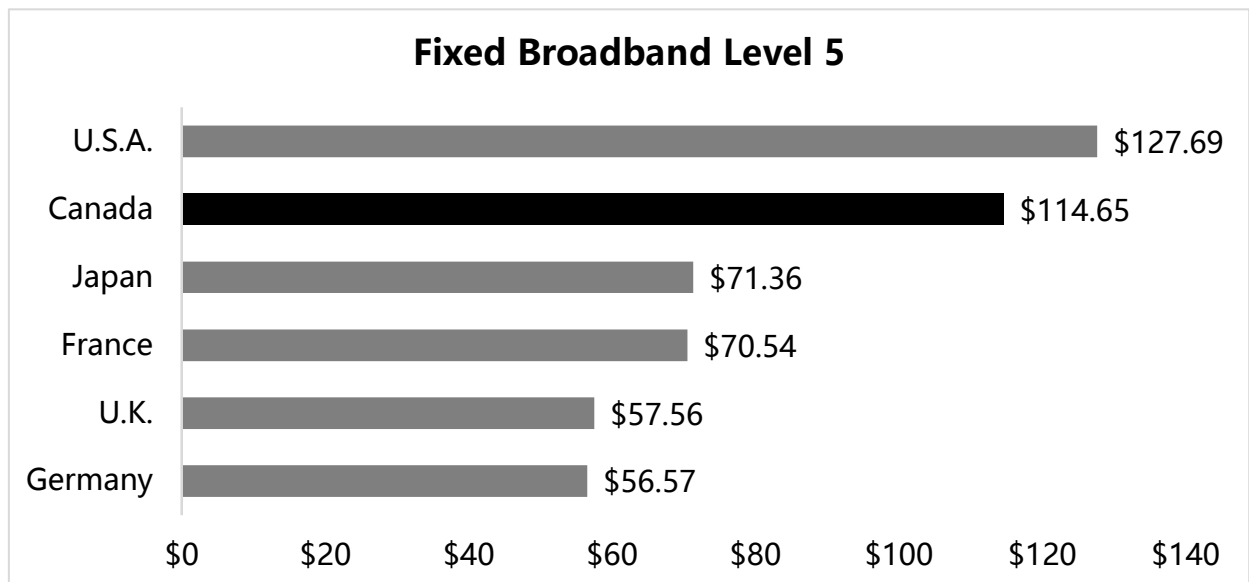
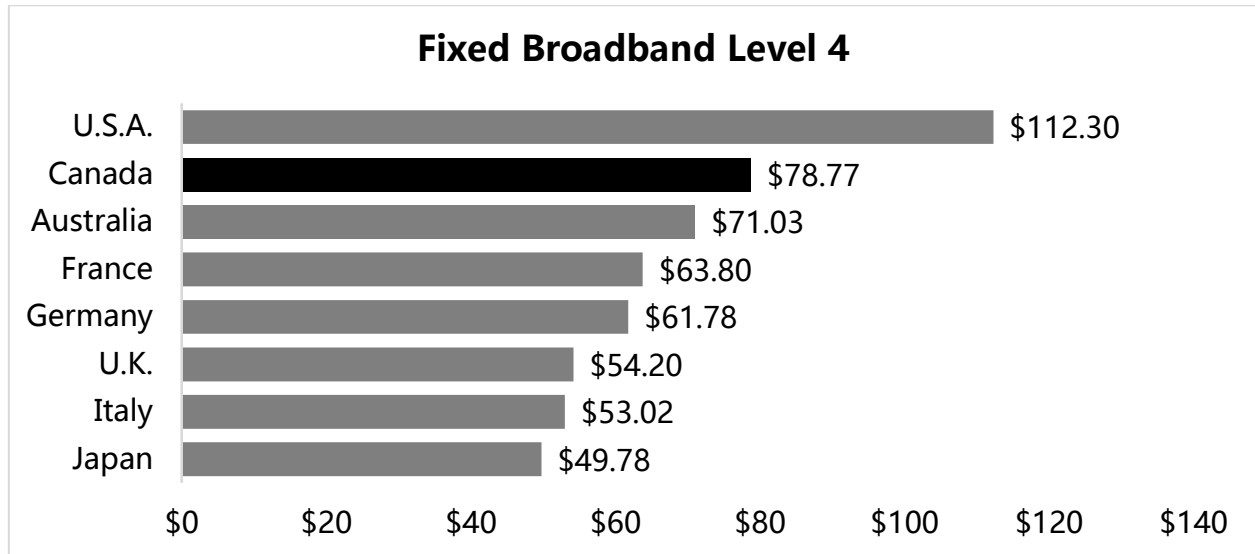
Figure D. 3 and Table D. 3 in Appendix D provide a detailed historical overview of the international Fixed Broadband Internet prices for the period of 2008 to 2016, for each of the five service baskets.

³⁵ This may be due to the fact that resellers have to pay incumbents wholesale access costs such as monthly access fees on per subscriber basis and capacity usage fees on a per 100 Mbps per subscriber basis. These wholesale access cost are potentially rising for the resellers due to significantly increasing trend in Internet usage, primarily driven by the video content "The average monthly amount of downloaded by residential subscribers increased 49% between 2014 and 2014 to 66.5 GB per month, and an average of 46% annually over the last 5 years, indicating that Canadians are likely using more video content and other high-bandwidth consuming services. Uploads have also increased 43% in 2014, reaching 8.6 GB per month" (CRTC Communications Monitoring Report, 2015, p. 188).

Figure 11 below, provides a 2016 ranking of Canada relative to seven foreign jurisdictions for the five Fixed Broadband Internet service baskets.

Figure 11: 2016 International Fixed Broadband Internet Price Comparison PPP-adjusted CDN\$





The key findings are:

- Offerings in the Level 1 service baskets (3Mbps – 9 Mbps) were not available in three countries: the UK, France and Italy;
- The prices in the US, UK, Germany and France increased;
- Overall, the prices in Italy, Australia and Canada decreased;
- Canadian Fixed Broadband Internet prices were among the top three highest prices, with the exception of service basket Level 2;
- Canada's prices were the second highest in higher service baskets Levels 4 and 5;
- Germany, Japan or the UK have the lowest prices across all baskets;
- US prices were the highest across all service Levels.
- Canada had the second lowest average for Level 1, after Germany.
- In Australia, lower priced plans with increased speed for Level 3 have become available since last year's Study. For example, a download speed of 16 to 40 Mbps was available in this year's Study at a

price that was over 20% cheaper than that of last year³⁶. It is also pertinent to note that in Australia consumers can pay AUD\$70 a month to acquire a bundle with broadband, home phone and TV, as compared to standalone Fixed Broadband Internet service at a price of \$80 per month. That is, a consumer can acquire TV and home phone services at no additional charge, while at the same time receiving a \$10 discount to the broadband subscription.

- UK service providers, specifically British Telecommunications (BT), increased their line access charge from £11.76 to £17.99. This mostly explains the overall 3% price increase in the UK within the past year.
- In Japan, Fixed Broadband Internet service providers no longer offered lower service baskets levels relative to the previous year. For example, in the previous year, NTT and JCOM offered plans for service Levels 1 to 4. This year, NTT's price plans were not available for Levels 1-4.
- The price increases for France, the US and UK were mostly attributable to the changes in currency conversion rates and PPP adjustment factors relative to the previous year.

Table 16 below, provides an overview of the average download/upload speeds and data caps available in Canada versus the US and six other countries. This comparison is based on the unweighted average of the advertised speeds and data caps of the surveyed service providers for each basket level.

With respect to the minimum and maximum average ranges between countries, the difference was greater within higher service basket levels. For example, within Level 4, the download speed difference was approximately 75 Mbps (151%) ranging from 57.2 Mbps (Canada) to 125.3 Mbps (Japan). For service Level 2, the difference in download speed was 4.5 Mbps (41%) ranging from 10.8 Mbps (Italy) and 15.2 Mbps (US).

For Levels 2 and 3, Canada ranked amongst the top three in download speed averages. However, for Level 4, Canada placed amongst the bottom three with respect to download speed.

³⁶ Significant reduction in the fixed broadband prices in Australia, relative last year, are mostly attributable to increasing competition between major internet service providers (Telstra and Optus). For example, Telstra reduced its prices by 16% in June 2015 - "Telstra's move is likely, partly, in response to Singtel-Optus' aggressive move to offer cheaper services that came with internet television provider Fetch TV and free subscriptions to video streaming service Netflix" (<http://www.smh.com.au/business/telstra-cuts-broadband-plan-fees-to-counter-rivals-20150626-ghyir7.html>).

Table 16: Current International Fixed Broadband Internet Speed Comparison

| Average Speeds (2016) | | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|-----------------------|-----------|--------|--------|-----------|--------|--------|--------|---------|--------|
| Level 1 | Download | 6.06 | 8.57 | 8.00 | n/a | n/a | n/a | 10.00 | n/a |
| | Upload | 0.87 | 0.97 | n/a | n/a | n/a | n/a | 0.60 | n/a |
| | Data Caps | 87.22 | 250.00 | 100.00 | n/a | n/a | n/a | n/a | n/a |
| Level 2 | Download | 12.50 | 15.20 | 12.00 | n/a | 15.00 | 9.50 | n/a | 12.00 |
| | Upload | 2.49 | 1.13 | n/a | n/a | n/a | 1.19 | n/a | 2.00 |
| | Data Caps | 137.00 | 250.00 | 200.00 | n/a | n/a | n/a | n/a | n/a |
| Level 3 | Download | 24.25 | 21.60 | 30.00 | 17.00 | n/a | 20.00 | 20.50 | 40.00 |
| | Upload | 5.34 | 1.20 | 2.00 | n/a | n/a | 10.00 | 1.70 | 2.00 |
| | Data Caps | 198.18 | 250.00 | 150.00 | n/a | n/a | n/a | n/a | n/a |
| Level 4 | Download | 57.22 | 63.75 | 50.00 | 54.67 | 100.00 | 100.00 | 75.00 | 50.00 |
| | Upload | 10.39 | 27.75 | 20.00 | 6.00 | 50.00 | 20.00 | 21.00 | n/a |
| | Data Caps | 290.91 | 250.00 | 150.00 | n/ | n/a | n/a | n/a | n/a |
| Level 5 | Download | 260.00 | 262.86 | n/a | 200.00 | 200.00 | n/a | 200.00 | 605.25 |
| | Upload | 35.00 | 390.00 | n/a | 12.00 | 50.00 | n/a | 12.00 | 505.00 |
| | Data Caps | 650.00 | 250.00 | n/a | n/a | n/a | n/a | n/a | n/a |

Above average reflect the simple average of speed published by respective country's surveyed operators included in each service basket category.

n/a: service basket not offered / information not available being not published by the operators.

Level 5 averages for Canada and Japan reflect ~1 Gbps service offered by some operators.

There are some key notable differences in the way Fixed Broadband Internet is offered in some of the surveyed countries relative to Canada. These differences are described below.

- Some operators only offer Fixed Broadband Internet in bundles with Fixed Telephony services. This is the case for example, with Verizon in Boston.
- Similarly, for some of the surveyed European countries, in order to obtain a Fixed Broadband Internet connection on a stand-alone basis, the consumer must, in some cases, also lease a Fixed Telephony connection (and correspondingly, pay an additional access line charge).
- Fibre and/or Digital Subscriber Line (DSL) based broadband services offered in the UK, France, Germany and Italy, generally include VoIP and/or Internet Protocol Television (IPTV) services for a single bundled price. The option of a pure stand-alone broadband Internet service is not available in some cases.
- In Japan, Fixed Broadband Internet service typically consists of two separate service elements: (i) a network access facility (fibre or Asymmetric DSL), often obtained from NTT and (ii) an Internet access service provided by a third-party ISP. Therefore, there are two fees involved: the broadband access fee and the ISP fee.

5.4 International Rural and Remote Fixed Broadband Internet Service Prices

This section provides a comparison of rural region Fixed Broadband Internet prices in Canada relative to the three other foreign jurisdictions (US, UK and Australia)³⁷. Contrary to urban markets, rural markets are not dominated by a few large players. Recognizing this fact, where possible we have included larger ISPs that cover the broader segment of rural and remote Canadian population. We retained the four Canadian service providers included in the previous year's Study - Xplornet, Storm, YourLink, and RuralWave. To better represent the province of Alberta in this Study, we also included Netago.

Accordingly, the following Canadian and International rural ISPs were surveyed:

- **Canada:** Xplornet, Storm, YourLink, RuralWave and Netago
- **US:** Skybeam, Digis, and Digitalpath
- **Australia:** SkyMesh, Active8me, and Aussie Broadband
- **UK:** Vispa, WiSpire, and eXwavia

For the above service providers, we collected their current service data in terms of the following parameters:

- Technology: Fixed Wireless (Microwave) technology generation (e.g. 4G or other)³⁸;
- Download and upload speeds: Range of service speeds in Mbps;
- Data caps: Range of monthly usage allowance (in GB/month);
- Service prices: Monthly service fees, equipment rental fees and data overage fees, as applicable; and
- Contract terms: where applicable.

We applied the same service basket definitions specified for the Fixed Broadband Internet Service for this Study. According to our research, the service providers surveyed (or any other rural Fixed Broadband Internet service providers) do not offer service packages with 100Mbps download speed. Therefore, the Level 5 service basket was not included in this analysis.

³⁷ Since the population in rural areas is sparse fixed broadband over fixed wireless (microwave) is considered to be more feasible. There are a large number of fixed wireless providers that offer broadband services to rural and remote areas of Canada as well as in other selected countries. Some fixed wireless ISPs serve more than one community and thus, selecting a representative sample of ISPs serving rural and remote areas is not straightforward.

³⁸ All of the surveyed fixed wireless services included in the Study are based on 4G or higher technologies. For Canada, the surveyed fixed wireless services providers cover rural areas in the provinces including New Brunswick, Quebec, Ontario, Alberta and Saskatchewan. Similarly, the surveyed fixed wireless services for the US, UK and Australia are provided for rural locations scattered across each of those countries.

Table 17 provides a summary of the average advertised download speeds and, where applicable, data caps for the surveyed rural & remote fixed wireless broadband services by service basket.

Table 17: Current International Rural Broadband Speed Comparison

| Average Speeds (2016) | | Canada | U.S.A. | Australia | U.K. |
|--|-----------|--------|--------|-----------|--------|
| Level 1 | Download | 5.20 | 5.33 | n/a | 8.67 |
| | Upload | 0.76 | 1.17 | n/a | 1.50 |
| | Data Caps | 80.00 | 125.00 | n/a | 41.67 |
| Level 2 | Download | 15.00 | n/a | 12.00 | n/a |
| | Upload | 2.00 | n/a | 1.00 | n/a |
| | Data Caps | 400.00 | n/a | 58.33 | n/a |
| Level 3 | Download | 25.00 | 20.00 | 25.00 | 22.00 |
| | Upload | 4.33 | 3.00 | 5.00 | 0.45 |
| | Data Caps | 366.67 | 250.00 | 156.67 | 100.00 |
| Level 4 | Download | 50.00 | n/a | 50.00 | 80.00 |
| | Upload | 10.00 | n/a | 20.00 | 20.00 |
| | Data Caps | 300.00 | n/a | 246.67 | n/a |
| Above average reflect the simple average of speed published by respective country's surveyed operators included in each service basket category. | | | | | |
| n/a: service basket not offered / information not available being not published by the operators. | | | | | |

In service Level 3 (16 Mbps – 40 Mbps) Canada has the highest data caps and, alongside Australia the highest download speeds. With respect to the other three service baskets, Canada has an average speed or above average speed in relation to the surveyed foreign jurisdictions.

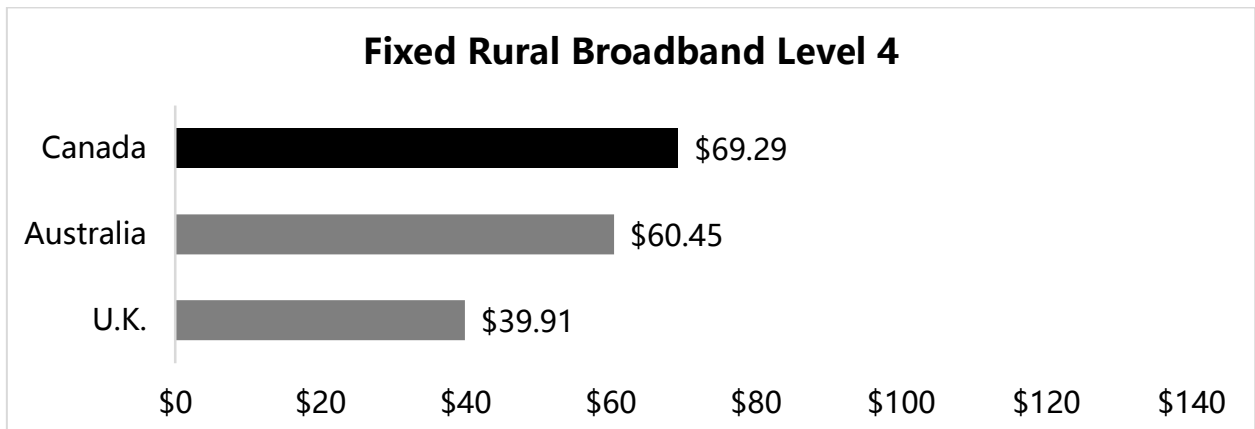
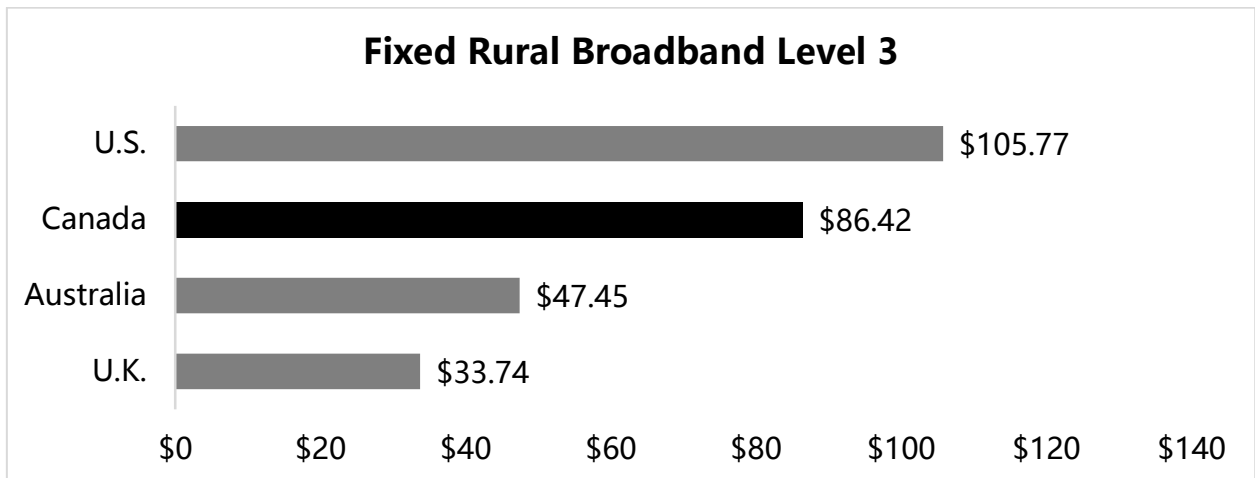
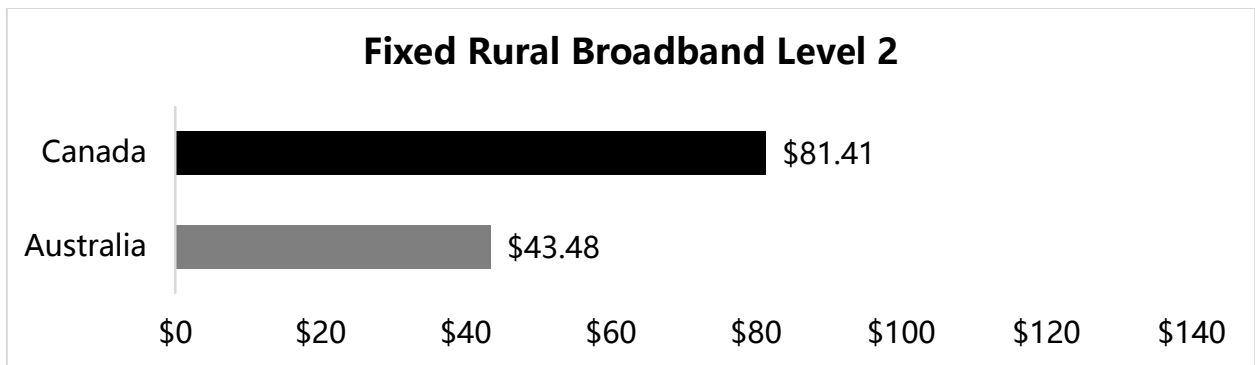
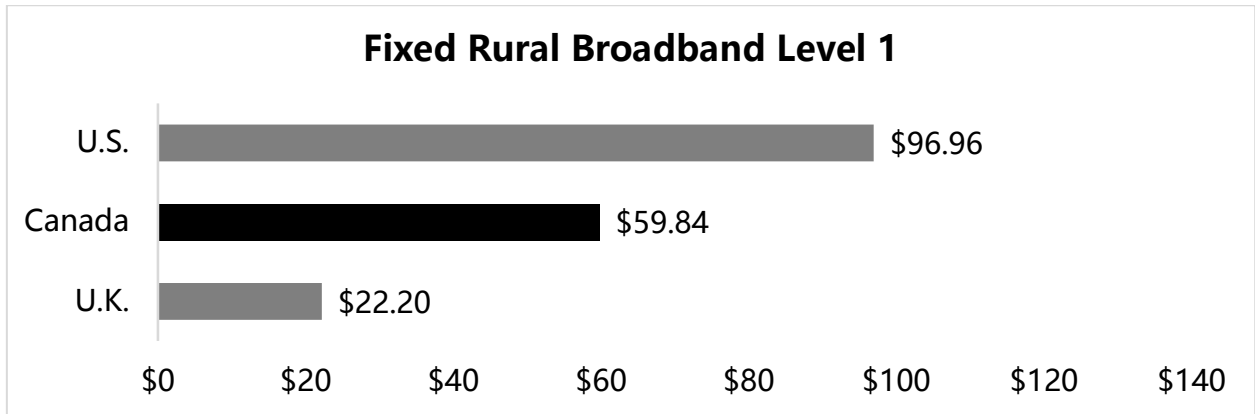
Canada's maximum upload speed (Level 4) averages 10 Mbps in comparison to 20 Mbps in the case of Australia and the UK.

As shown in Figure 12, weighted average prices for rural Fixed Broadband Internet in the UK and Australia are significantly lower than those of Canada and the US in all four service baskets³⁹. Canada's prices were the highest in Levels 2 and 4 and the second highest in Levels 1 and 3.

For Level 4, Canada's average (\$69.29) is lower than Levels 2 and 3. This is partly due to the fact that ISP Storm only offered service with download speeds of up to 50 Mbps with prices up to \$39.00 (Level 1), \$54.00 (Level 2), \$59.00 (Level 3) and \$69.00 (Level 4). The other four Canadian rural Fixed Broadband Internet providers (Xplornet, YourLink, RuralWave and Netago) surveyed offered services up to Level 3 at significantly higher prices.

³⁹ Weighted average prices were calculated based on equal market share distributed among services providers surveyed in each country. This approach was taken because actual market share data by service provider were not available, given the nature of their operations and ownership structure.

Figure 12: 2016 International Rural Fixed Broadband Internet Price Comparison PPP-adjusted CDN\$



6. Mobile Wireless Internet Service

6.1 Mobile Wireless Internet Service Baskets

The 2015 Study considered two Mobile Wireless Internet service baskets represented by Level 1 with 2 GB data usage/month and Level 2 with 5 GB data usage/month. This year's Study adds another higher-level service basket – Level 3 – with 10 GB or more of data usage/month, as described below.

- **Level 1:** 2 GB to less than 5 GB per month⁴⁰
- **Level 2:** 5 GB to less than 10 GB per month
- **Level 3:** 10 GB or more per month

The key Mobile Wireless Internet service information collected for each surveyed mobile wireless internet service provider was based on the following usage-based elements and service features:

- Technology: 3rd or 4th generation (3G, 3G+/4G or 4G/LTE)
- Service Speed: Advertised download speed⁴¹
- Data usage per month
- Equipment: USB modem key (included with service on a no-charge, rental or purchase-basis)

One-time charges, such as installation costs, are excluded from price data.

6.2 Canadian Mobile Wireless Internet Service Prices

This section provides a summary of Mobile Wireless Internet prices offered in Canada by incumbents and compares such prices with those offered by MVNOs/resellers and new entrants.

Figure 13 below provides a picture of year-over-year change in Mobile Wireless Internet prices for Level 1 and 2 service baskets from 2015 to 2016.

- For the Level 1 Mobile Wireless Internet service basket, the average prices in Canada showed an increase of 6.7% from 2015 to 2016. Level 1 increased for all cities ranging between 4.3% (Regina) and 7.7% (Toronto).
- For the Level 2 service basket, the average Mobile Wireless Internet prices decreased by 1.8% from 2015 to 2016. With the exception of Montreal (3.4% increase), the average Mobile Wireless Internet prices in the remaining surveyed Canadian cities decreased within the past year, ranging between 0.8% (Regina) and 5.0% (Halifax).

⁴⁰ Most of the lowest usage mobile wireless internet service plans offered by service providers allow a data usage limit of either 100 MB or 500 MB, with the next jump directly to 2 GB data usage plans. Furthermore, some service providers (for example, Eastlink in Halifax) offer 3GB/month as the lowest data usage service plan. To ensure better comparison of plans and prices, the Study redefines Level 1 to represent prices for service plans with data usage of 2GB to 5 GB per month.

⁴¹ Advertised speeds may vary significantly from the actual speeds in case of mobile wireless services. Actual average speeds are sensitive to local network usage levels and users' locations, among other factors. Some wireless service providers include theoretical maximum speeds in their advertising, while others use - or at least note, expected average speeds in their advertising. Consequently, comparing service speeds across service providers and countries is not straightforward even when the same mobile wireless technology is in use.

Figure 13: Year-over-Year Change in Canadian Mobile Wireless Internet Prices for Level 1 and 2 Service Baskets (2015-2016)

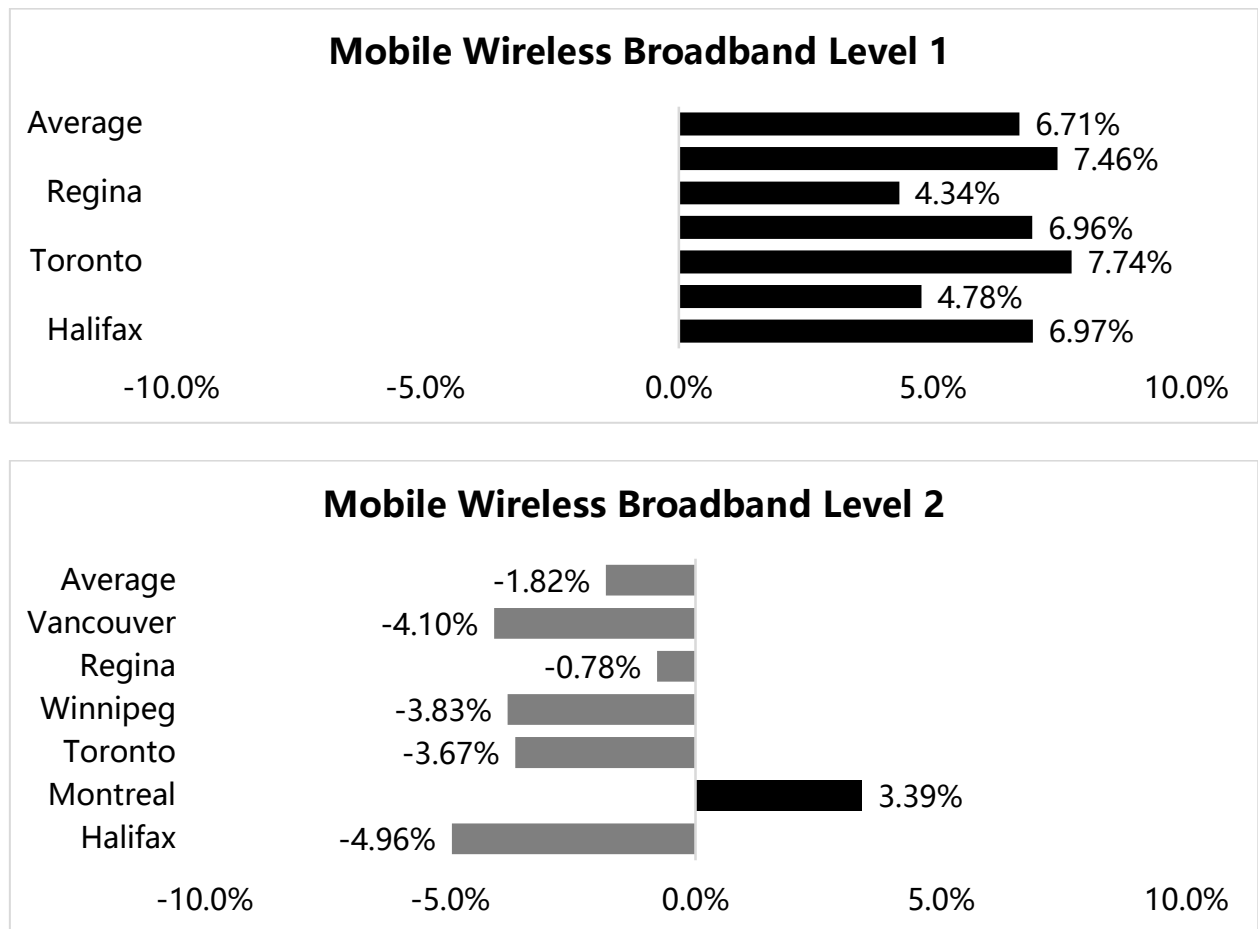


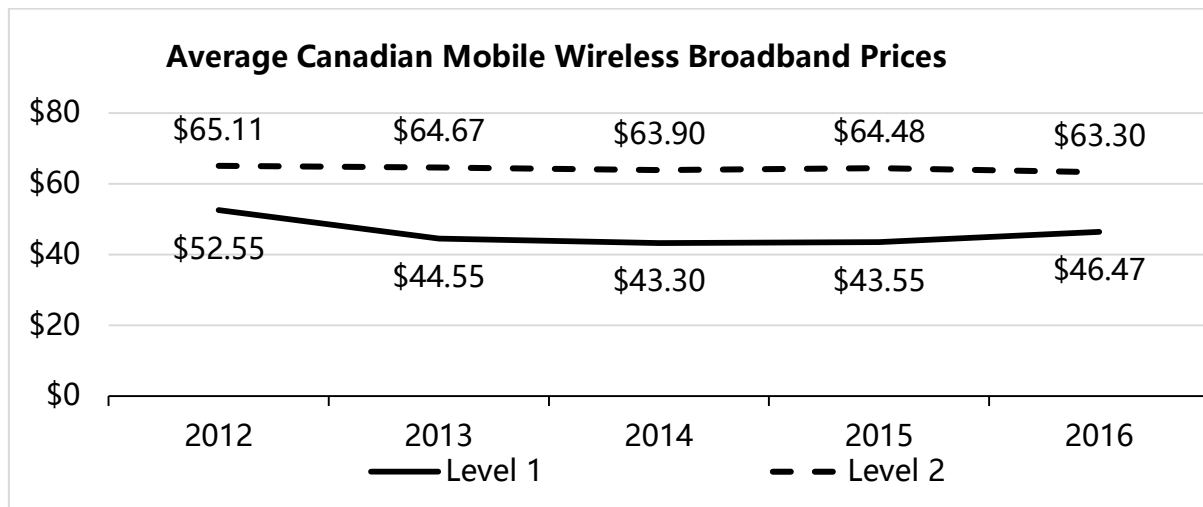
Figure 14 provides a summary of Canadian average prices for Mobile Wireless Internet service baskets. The weighted average prices range from \$46.47 per month for Level 1 to \$80.98 per month for Level 3.

Figure 14: 2016 Weighted Average Canadian Mobile Wireless Internet Prices by Service Basket



Figure 15 below compares the Canadian Level 1 and 2 Mobile Wireless Internet service basket prices for the period of 2012 to 2016. There is no historical price information available for Level 3 as it has been included in this Study for the first time. More detailed price information by city is provided in Figure C. 4 and Table C. 5 in Appendix C.

Figure 15: Weighted Average Canadian Mobile Wireless Internet Prices by Service Basket (2012-2016)



6.2.1 Comparison of Incumbent, MVNOs, and New Entrant Prices

This section compares the average Mobile Wireless Internet prices offered by incumbents with that of new entrants and MVNOs/resellers.

Table 18 below, compares the 2016 Mobile Wireless Internet service prices offered by Canadian incumbents (Bell, Rogers and TELUS) and new entrants (Eastlink, Videotron and WIND) for the three service levels, as applicable in the cities of Halifax, Montreal, Toronto and Vancouver.

Table 18: 2016 Canadian Mobile Wireless Internet Service Prices – Incumbent versus New Entrants

| Service Basket Level | Service Provider Type | City | | | | Average (City)* |
|----------------------|-----------------------|----------|----------|----------|-----------|-----------------|
| | | Halifax | Montreal | Toronto | Vancouver | |
| Level 1 | Incumbents | \$ 46.53 | \$ 46.53 | \$ 46.53 | \$ 46.25 | \$ 46.46 |
| | New Entrants | \$ 35.00 | \$ 35.00 | \$ 41.21 | \$ 41.21 | \$ 38.10 |
| | Difference (%) | -24.77% | -24.77% | -11.43% | -10.90% | -17.98% |
| Level 2 | Incumbents | \$ 63.19 | \$ 63.19 | \$ 63.19 | \$ 60.00 | \$ 62.40 |
| | New Entrants | \$ 45.00 | \$ 55.00 | \$ 41.21 | \$ 41.21 | \$ 45.60 |
| | Difference (%) | -28.79% | -12.97% | -34.79% | -31.32% | -26.91% |
| Level 3 | Incumbents | \$ 78.89 | \$ 81.53 | \$ 81.53 | \$ 85.00 | \$ 81.74 |
| | New Entrants | n/a | \$ 75.00 | \$ 41.21 | \$ 41.21 | \$ 52.47 |
| | Difference (%) | n/a | -8.01% | -49.45% | -51.52% | -35.80% |

Level 1: 2GB to less than 5GB per month; Level 2: 5GB to less than 10GB; and Level 3: 10GB or more.

No New Entrant was found in the other two cities: Winnipeg and Regina.

Only one New Entrant was found in the above four cities - Eastlink (Halifax), Videotron (Montreal), Wind (Toronto and Vancouver).

Incumbents' prices represent the unweighted averages.

If new entrant price was not available for a service level, its price for the next higher level (if available) was included.

* unweighted averages

For the Level 1 service basket, the new entrants' prices were roughly 18% lower than the average prices offered by the incumbents. For the Level 2 Mobile Wireless Internet service basket, the new entrants' prices were roughly 27% lower than the average incumbents' prices. For the higher usage basket – Level 3, new entrants' prices were 36% lower than the average prices offered by the incumbents.

Compared to last year, the new entrants' Mobile Wireless Internet average price discounts relative to the incumbents decreased from 22% to 18% (Level 1) and from 32% to 27% (Level 2). The reduction in the overall price differential this year is primarily due to price increases by Eastlink (Halifax) and WIND (Toronto and Vancouver) for Levels 1 and 2 prices within the past year.

Mobile Wireless Internet services were not offered by the surveyed MVNOs/resellers (Primus, PC Mobile). Therefore, the price comparison of Mobile Internet prices between incumbents, new entrants and MVNO is not provided in this Study.

6.3 International Mobile Wireless Internet Service Prices

Table 19 provides a summary of the average Level 1, 2 and 3 advertised monthly data caps (GB/month) and download speeds (Mbps) for Canada and each of the seven surveyed foreign jurisdictions. The upload speeds are often not advertised by wireless service providers and, therefore, are not included in Table 19.

The data in Table 19 below, indicate that the advertised download speeds for Mobile Wireless Internet service plans vary significantly across countries. The average advertised download speed of the surveyed Canadian Mobile Wireless Internet services was roughly 165 Mbps. Higher advertised download speeds were found in Japan, Italy and France (i.e., 188, 200 and 225 Mbps, respectively). In other foreign jurisdictions, considerably lower average advertised download speeds were found. The UK has the lowest average advertised download speed at 33.6 Mbps.

Table 19: International Comparison of Average Download Speeds (Mbps) and Usage Caps (GB/month) (2016)

| Service Basket Level | | Country | | | | | | | |
|---|----------|---------|-------|-------|--------|-----------|--------|---------|--------|
| | | Canada | US | UK | France | Australia | Japan | Germany | Italy |
| Level 1 | Download | 164.68 | 33.74 | 33.60 | 225.00 | 75.00 | 187.60 | 133.00 | 200.00 |
| | Data Cap | 2.50 | 2.50 | 2.40 | 2.00 | 2.50 | 2.50 | 2.67 | 3.00 |
| Level 2 | Download | 164.68 | 33.74 | 33.60 | 225.00 | 75.00 | 187.60 | 133.00 | 200.00 |
| | Data Cap | 5.50 | 6.00 | 6.50 | 6.33 | 5.25 | 6.00 | 5.67 | 5.75 |
| Level 3 | Download | 164.68 | 33.74 | 33.60 | 225.00 | 75.00 | 187.60 | 133.00 | 200.00 |
| | Data Cap | 10.00 | 10.67 | 12.50 | 18.00 | 10.75 | 10.00 | n.a. | 13.50 |
| Level 1: 2GB to less than 5GB per month; Level 2: 5GB to less than 10GB; and Level 3: 10GB or more. | | | | | | | | | |
| Download speed and data cap are unweighted average of surveyed service providers in the country. | | | | | | | | | |

The comparison in Table 19 is based on the advertised speeds of the networks rather than the estimated actual use speeds. The reasoning behind this decision was that the advertised speeds represent the speed at which the service operator suggests the consumer could reach in optimal conditions, rather than the estimated actual use speeds, which vary based on device and conditions. This approach is consistent with previous Studies.

Service speeds are dictated largely by technology. Many of the reviewed services use similar technologies. In Canada, the US, France, Germany, Italy and Japan, most of the surveyed service

providers offer 4G LTE mobile Internet service plans. Despite using the same technology, advertised download speeds vary considerably across countries. Average advertised download speeds in the US range from 20.9 to 49 Mbps on 4G LTE network. In contrast, as noted earlier, Rogers, Bell and TELUS advertise 4G LTE download speeds from 100 to 335 Mbps. Similarly, Orange and Bouygues Telecom in France also advertise 4G LTE download speeds from 150 to 300 Mbps, respectively. At the other end of the spectrum, NTT Docomo, in Japan, advertises 4G LTE download speeds of up to 225 Mbps. Consequently, differences in advertised speeds for the same technology are significant.

The surveyed service providers in the remaining countries, the UK and Australia, generally offer 4G or 4G+ service plans at this time. In these cases, download speeds of between roughly 7.2 Mbps and 75 Mbps are advertised.

Figure 16 below, provides an overview of the change in International Mobile Wireless Internet Prices for Level 1 and 2 Service Baskets within the past year (2015 to 2016).

Figure 16: YoY (%) Change in International Mobile Wireless Internet Prices for Level 1 and 2 Service Baskets (2015-2016)

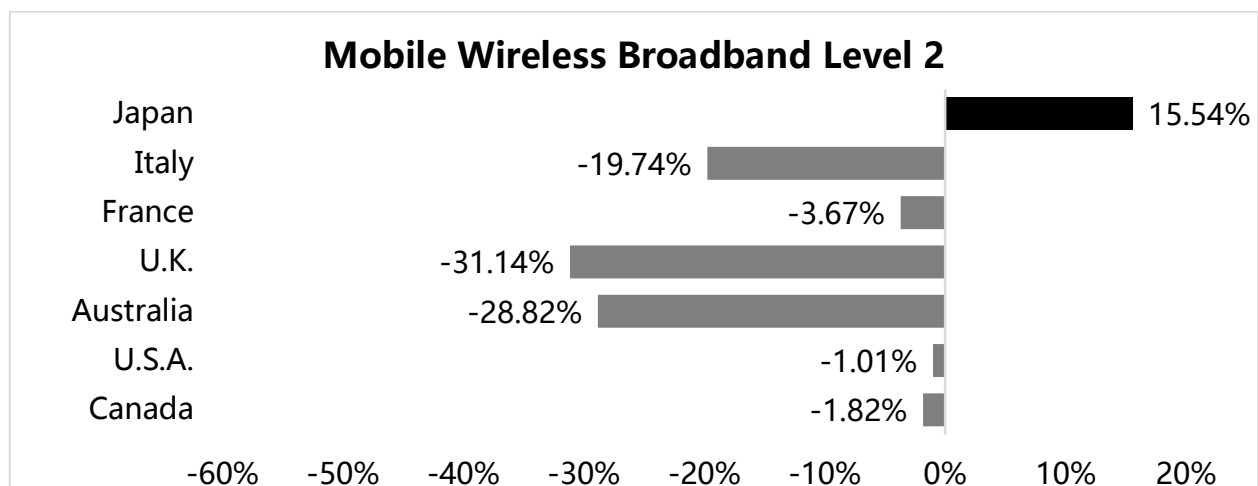
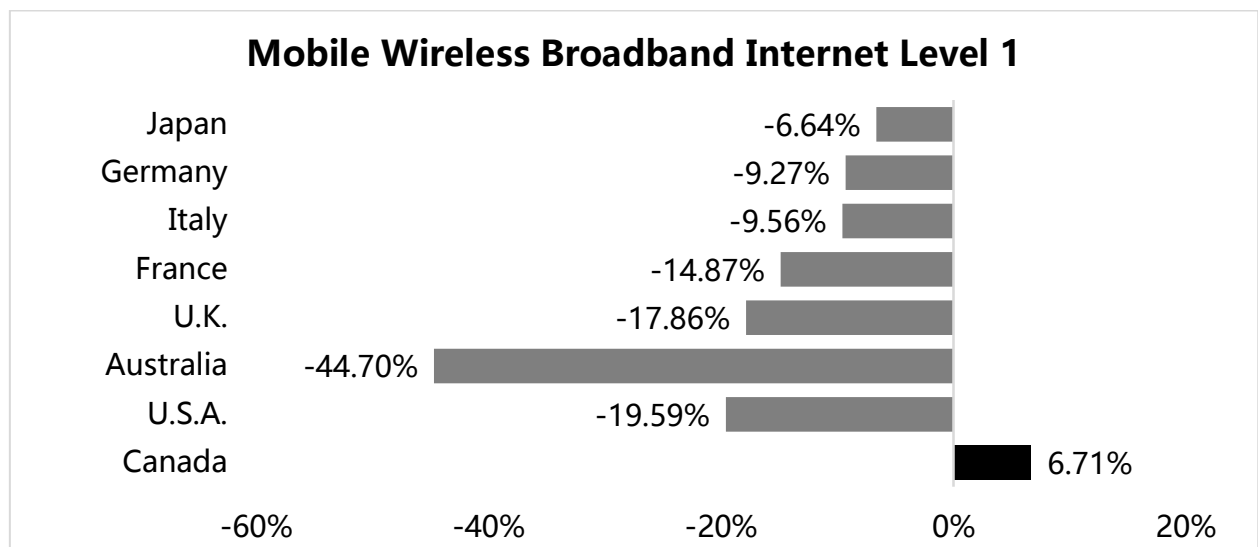
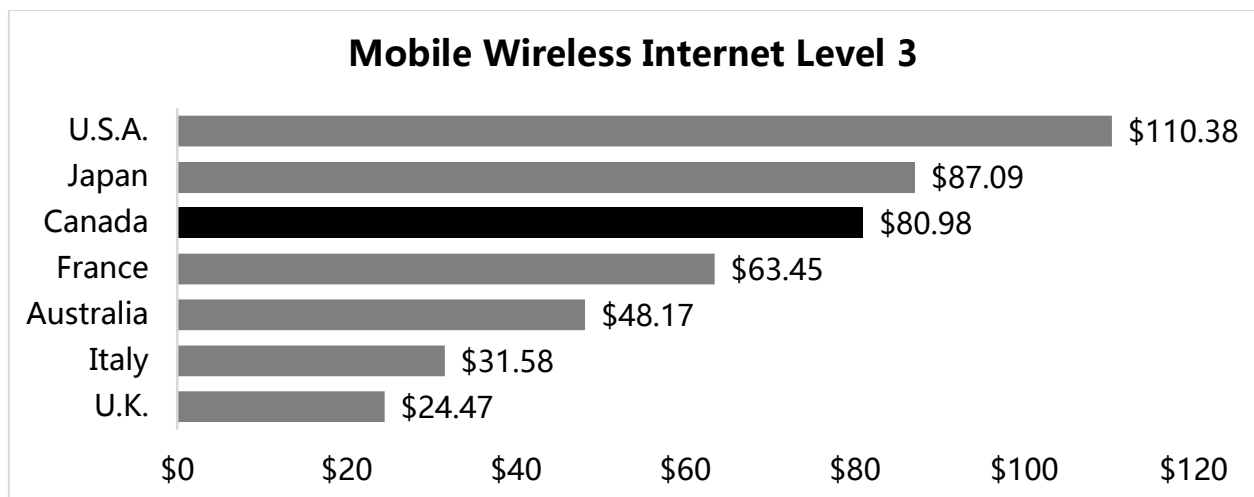
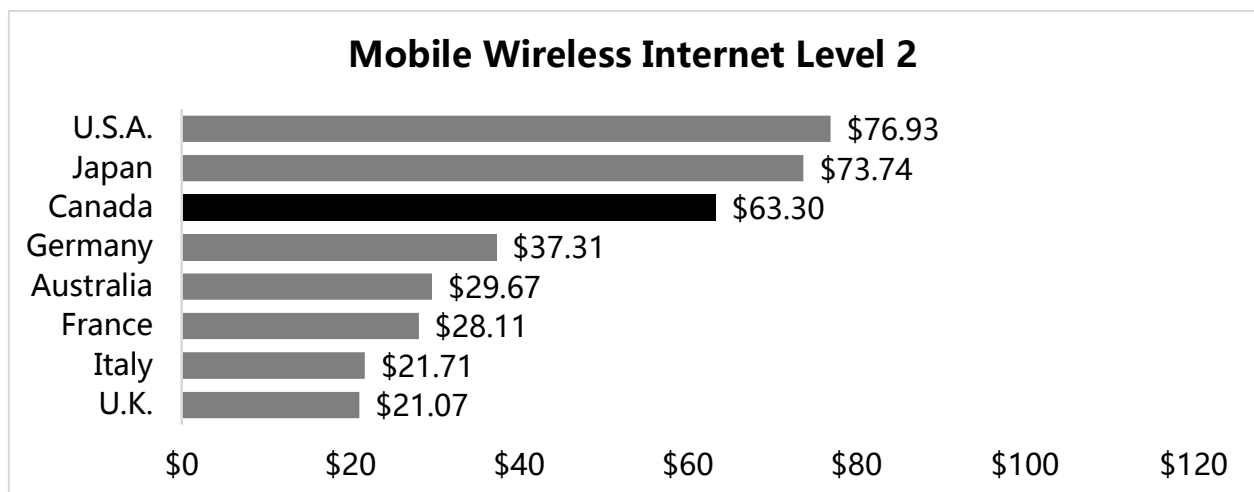
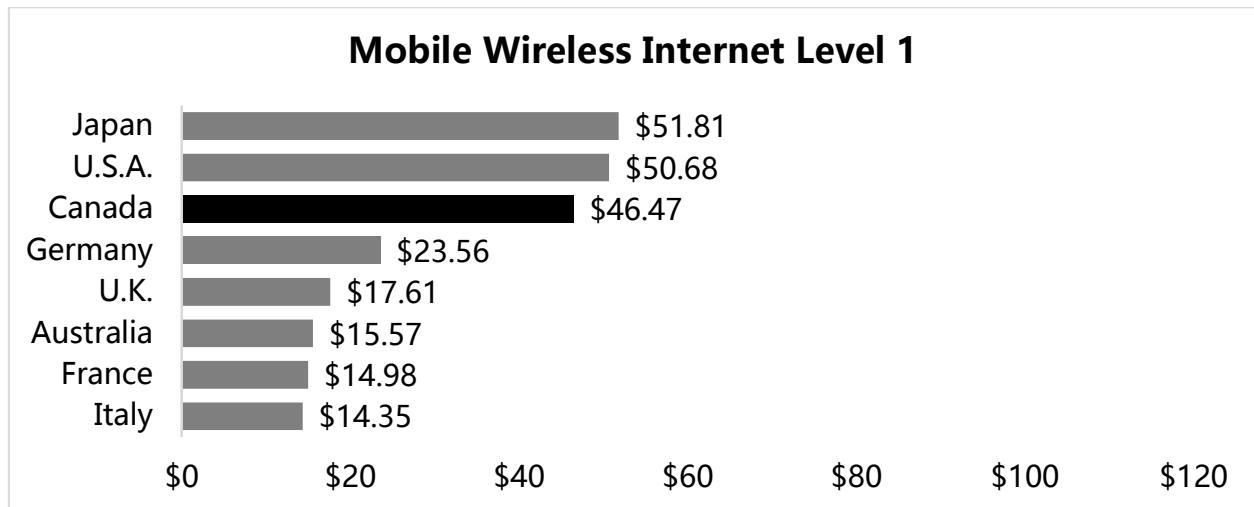


Figure D. 4 and Table D. 4 in Appendix D provide a detailed historical view of international Mobile Wireless Internet prices from 2008 to 2016. Figure 17 below, provides comparison of the 2016 international Mobile Wireless Internet prices.

Figure 17: 2016 International Mobile Wireless Internet Price Comparison PPP-adjusted CDN\$



The key trends are summarized below:

- Mobile Internet Prices for Level 1 significantly decreased in all foreign jurisdictions, relative to previous year. For example, Australia (-45%), US (-20%), UK (-18%) and France (-15%). However, in Canada, Level 1 Mobile Internet prices increased by 7%.
- Canada's average prices in 2016 ranked the third highest for all three service levels, after US and Japan. These 3 countries were the only ones with price increases in the Level 2 service basket.
- The changes in international Mobile Internet prices as shown in Figure 16 above, can be accounted for by a number of market factors and a general trend towards changes in service offerings in this sector. For example:
 - Australia experienced a significant decrease in prices - a 45% decrease in Level 1 and a 29% decrease in Level 2 service basket. As is the case within other markets where a small number of operators exist, a change in a single plan can result in significant changes either upward or downward. In this case, where last year's Study captured two plans in Level 1 service basket, at a totally monthly charge of \$36.36 and \$30.91, this year's data portrayed the availability of a single plan from Optus, at a monthly cost of \$18.18. In addition, whereas last year's offerings entailed a data cap of 4 GB, the current plan offers 3 GB instead. This is one of several examples showing a general trend toward changing data caps and lower prices.
 - In other cases, the addition of new providers in this year's Study also resulted in a notable difference in the percentage of the market held by different operators. For example, in the previous year, the market shares of surveyed service providers in the UK were: Vodafone (42%), Virgin (7%) and EE (52%). This year's market shares were: Virgin (8%), Vodafone (21%), EE (37%), O2 (24%) and Three (11%). As the average plan prices are weighted, these differences contributed to significant price decrease in UK, relative to previous year.

7. Bundled Services

7.1 Bundled Service Baskets

The 2016 Study includes the following three Bundled Service baskets⁴²:

- **Bundle 1:** Fixed Telephony, Fixed Broadband Internet and Mobile Wireless Telephony
- **Bundle 2:** Fixed Telephony, Fixed Broadband Internet and TV package
- **Bundle 3:** Fixed Telephony, Fixed Broadband Internet, Mobile Wireless Telephony and TV package

For the Fixed Telephony, Fixed Broadband Internet and Mobile Wireless Telephony elements in each bundle, Level 2 stand-alone service standards are used. For the TV package element, a 'basic' digital TV service option is included in the bundle. In cases where Level 2 service options (i.e. Fixed Telephony, Fixed Broadband Internet or Mobile Wireless Telephony) were not available, higher-level service options (e.g., Level 3 or 4) have been included. Table B.5 in Appendix B provides a detailed summary of the service elements used for the bundled service price comparison.

7.2 Canadian Bundled Service Prices

All Canadian incumbents included in this section offered a variation of all three defined bundled services, with the exception of Rogers in Toronto, who only offered bundles with TV packages. Thus, only Bundles 2 and 3 were considered for Rogers in Toronto. Only Bundle 2 was included for Access Communications and Shaw, whom do not offer Mobile Wireless Telephony services. Furthermore, since Primus does not provide TV services, only Bundle 1 was considered in the comparison.

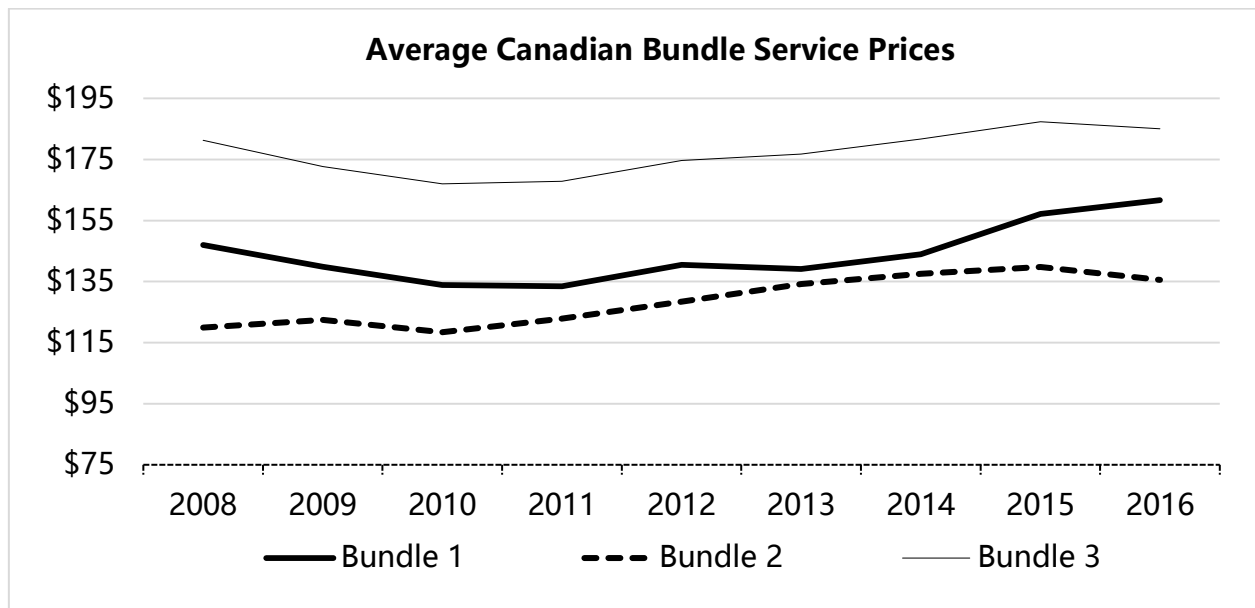
TV packages offered in the Canadian market vary considerably in delivery technologies (cable, IPTV and satellite), channel inclusions and features. These differences can contribute to price variations. Based on the surveyed plans, Canadian basic digital TV packages, with minimal features, were available on a stand-alone basis with a price range of \$25.00 (Videotron and SaskTel) to \$55.00 (EastLink). Price variation within TV packages accounted for a considerable contribution to the price differences in Bundles 2 and 3.

Figure 18 below, provides a summary of Canadian average monthly prices for each of the three Bundled Service baskets for the period 2008 to 2016. More detailed information for the period 2008 to 2016, is provided in Figure C. 5 and Table C. 6 in Appendix C. Key trends in Canadian bundled services prices are summarized below.

- **Bundle 1:** the price increased from \$157.20 in 2015 to \$161.63 in 2016, an increase of 2.8%. Average 2016 Bundle 1 prices varied widely by city, ranging from a low of \$138.46 in Vancouver to \$176.67 in Toronto. Average price in 2008-2016 increased by 1.2% on an annualized basis.
- **Bundle 2:** the price decreased from \$139.78 in 2015 to \$135.60 in 2016, a decrease of 3.0%. Average 2016 Bundle 2 prices also varied widely by city, ranging from \$105.39 in Regina to \$159.60 in Halifax. Over the period 2008-2016, similar to those of Bundle 1, prices of Bundle 2 have increased at a moderate annualized rate of 1.5%.
- **Bundle 3:** the price decreased from \$187.33 in 2015 to \$185.06 in 2016, a slight decrease of 1.2%. In this case, the lowest average Bundle 3 price was found in Regina at \$137.22, significantly lower than the price a year before. The highest price was found in Halifax at \$206.09. More stable than the other two bundles, Bundle 3 prices only experienced slight growth of 0.3% since 2008, on an annualized basis.

⁴² Bundled Service price comparison does not include the "Skinny" basic TV service which was mandated by the CRTC and became effective April 1st, 2016, after the completion of the data collection for this Study.

Figure 18: Average Canadian Bundled Service Prices by Service Baskets (2008-2016)

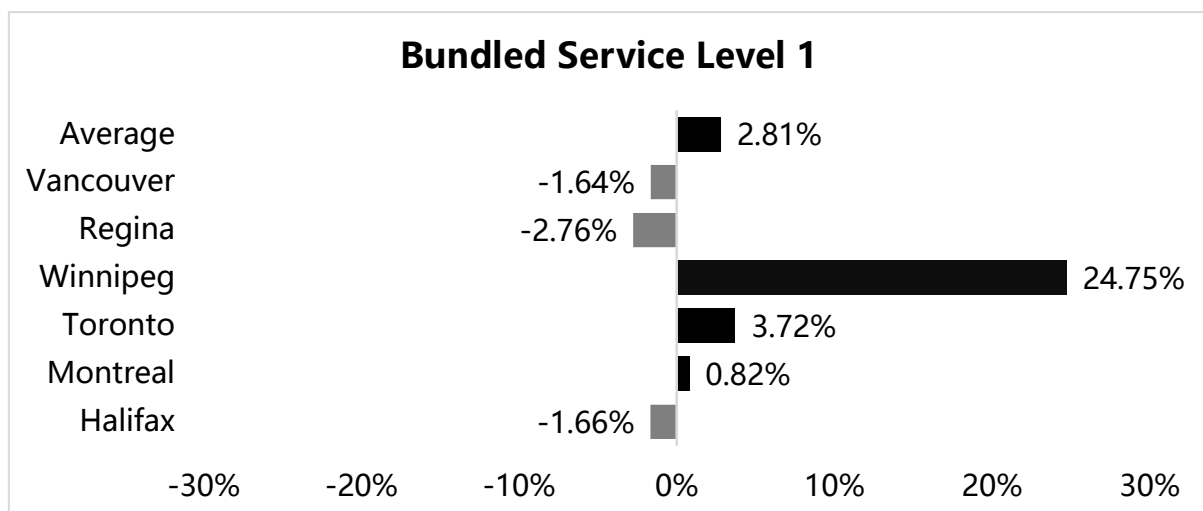


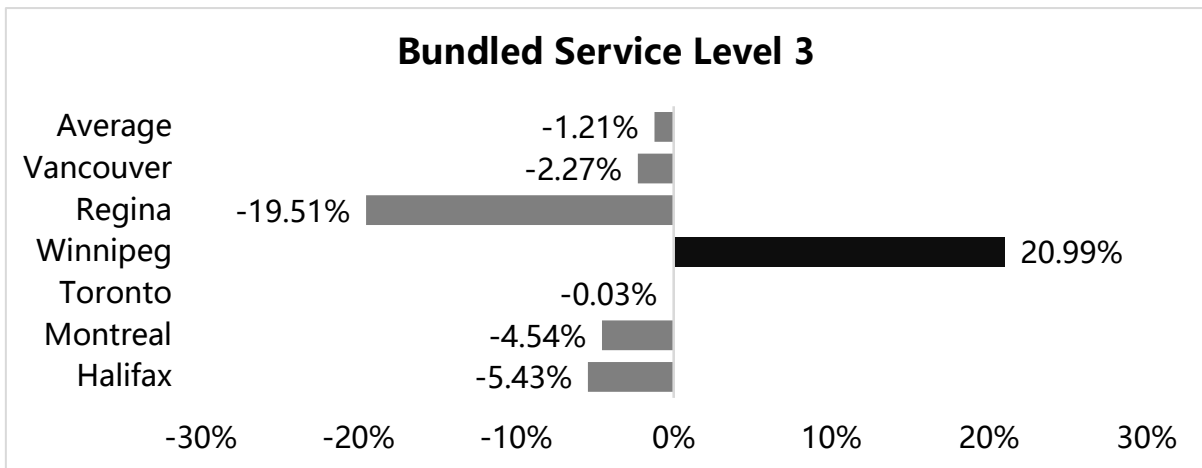
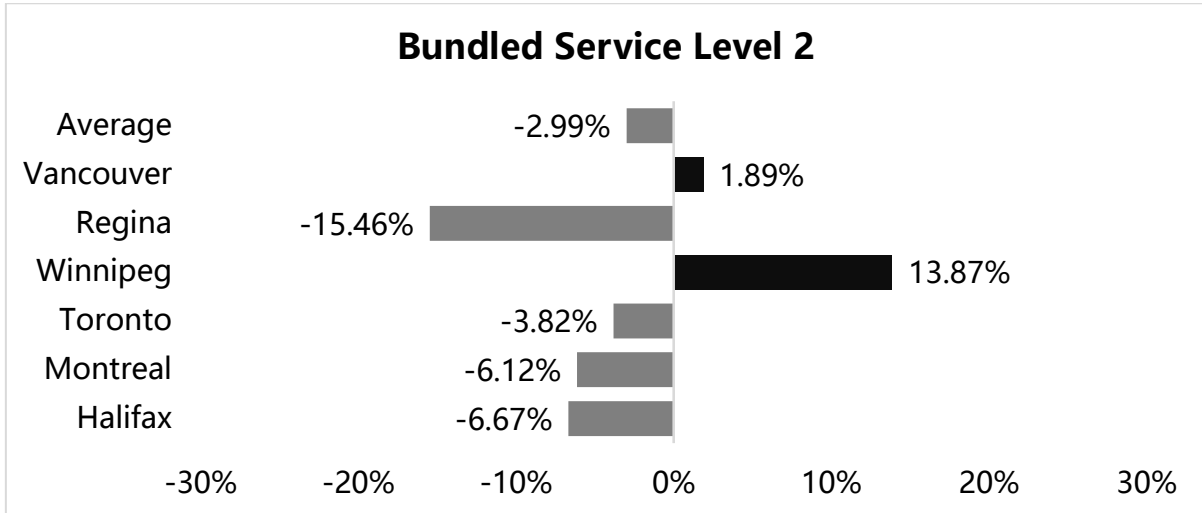
Bundling discounts vary by service providers and with respect to service offerings. For example, TELUS offered a fixed dollar amount as a discount while others, such as Videotron, offered a percentage discount. Canadian bundling discounts averaged 15.9% in Bundle 1, 14.8% in Bundle 2 and 12.2% in Bundle 3.

Figure 19 below, provides an overview of the changes in the three bundled service baskets since 2015. Key highlights are:

- New bundling discount structures introduced in Regina by SaskTel and Access, significantly reduced the costs for consumers to subscribe to Bundle 2 and Bundle 3 services.
- Bundle prices have increased in Winnipeg, mainly due to the costlier Level 2 Total Home Phone plan offered by MTS, contributing to an increase of over 10% in Bundle 2 and over 20% in Bundles 1 and 3.

Figure 19: YoY Change in Canadian Bundled Service Prices (2015-2016)





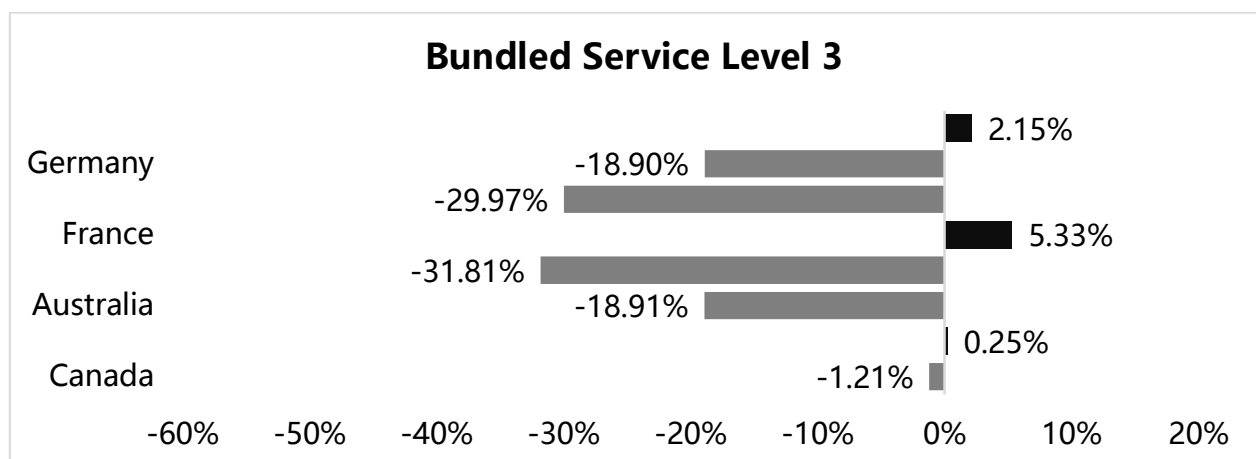
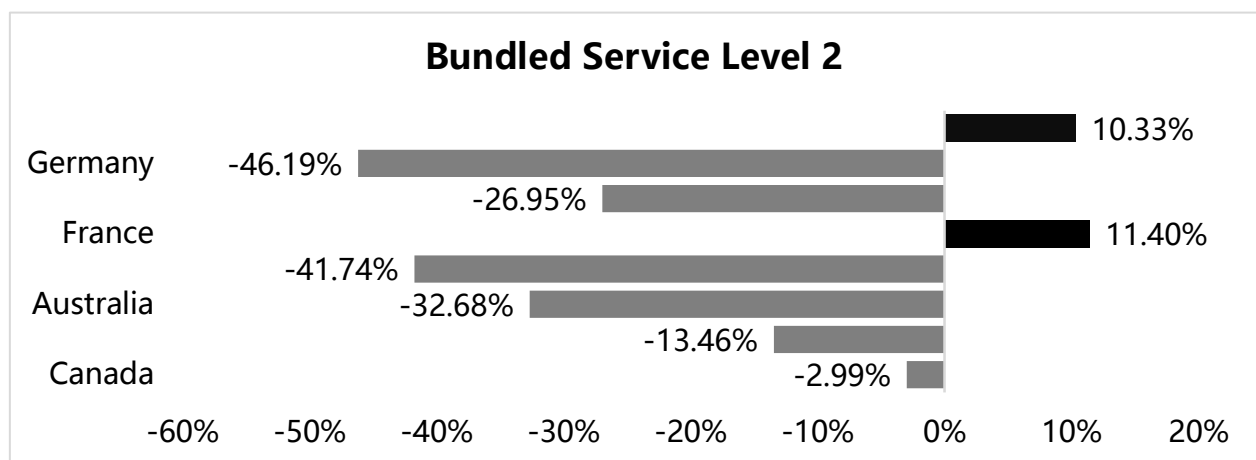
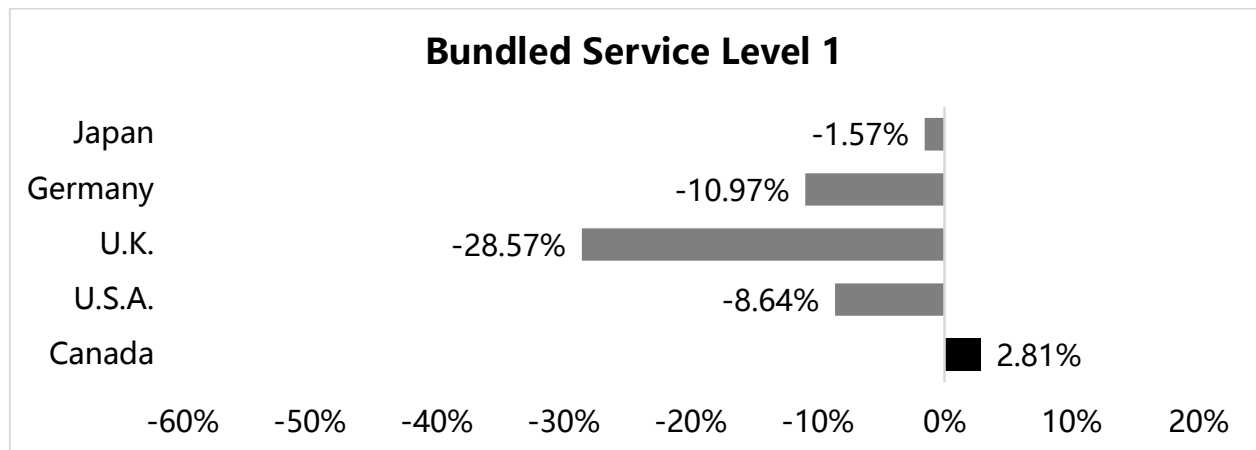
7.3 International Bundled Service Prices

Not all of the surveyed international service providers offered all of the three defined bundled services. For example, Time Warner Cable and Comcast do not have in-house Mobile Wireless Telephony service offerings, thus they do not qualify for comparison in Bundles 1 and 3. Similarly, service providers in other foreign jurisdictions, such as Telstra and Optus in Australia, Orange and Numericable-SFR in France, Telecom Italia and FastWeb in Italy and Deutsche Telekom in Germany do not offer bundles without a TV package component. For these latter companies, only Bundle 2 and Bundle 3 are considered for comparison.

As stated above, TV packages offered by Canadian providers vary in delivery technologies, channel inclusions and features. This also applies to international service providers, where price differentials in TV packages from different providers have a substantial impact on the total costs of the bundles.

Figure 20 below, provides an overview of yearly changes of 2016 bundle prices from 2015, in Canada and each of the seven foreign jurisdictions, and for each of the three bundled service baskets. More detailed information can be found in Figure D. 5 and Table D. 5 in Appendix D.

Figure 20: Change in International Bundled Service for Level 1 to 3 Service Baskets (2015-2016)

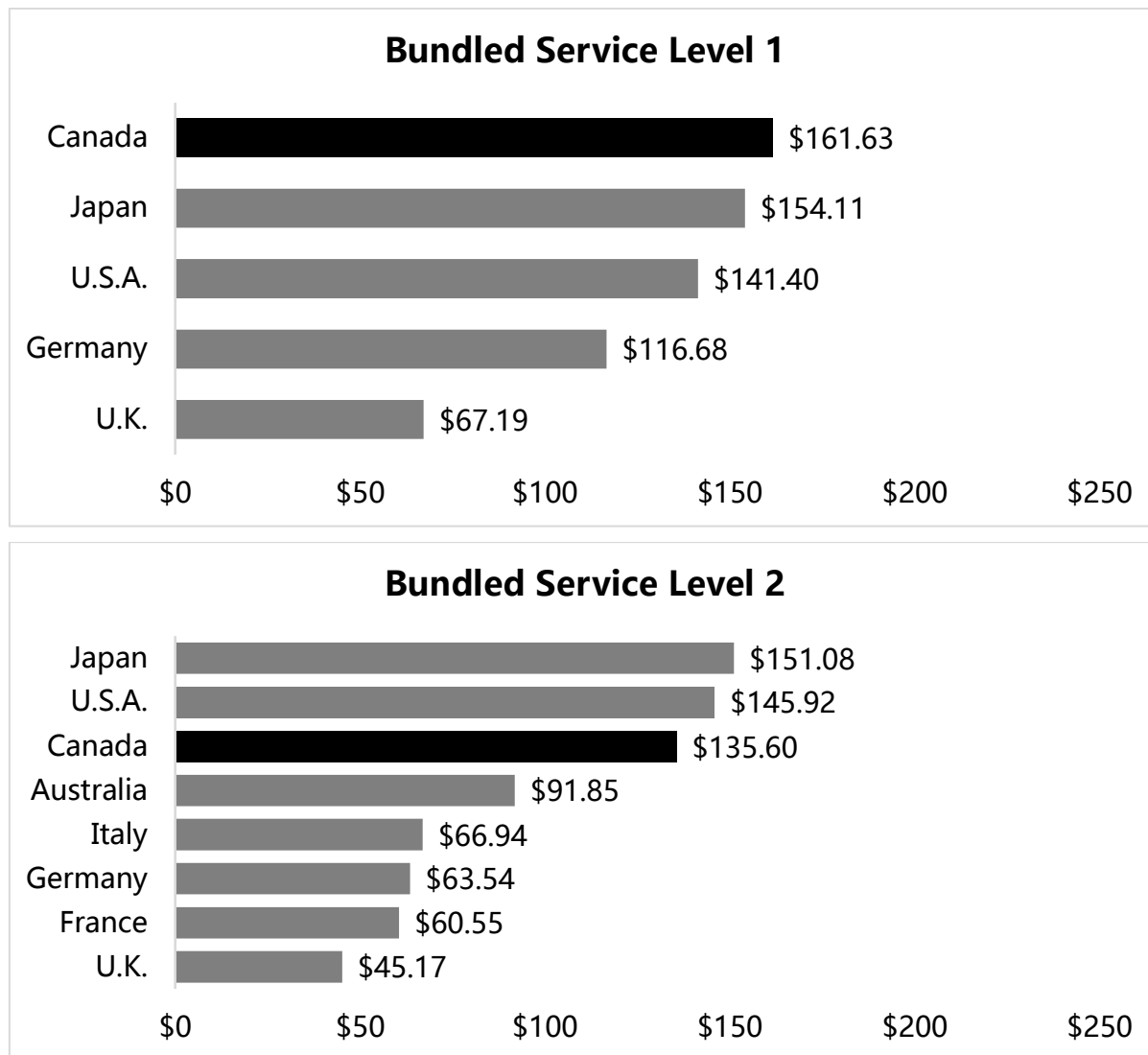


Service providers in Australia, the UK, Germany and Italy offered bundled services with additional features at lower prices. The major downward movement in the prices of bundled services in international jurisdictions, is attributable to the difference in the interpretation of certain elements of bundled services in the 2015 Study relative to the 2016 Study⁴³. In light of these changes in methodology,

relative to the previous year, the reader is advised to take caution in comparing 2016 prices with those of previous year.

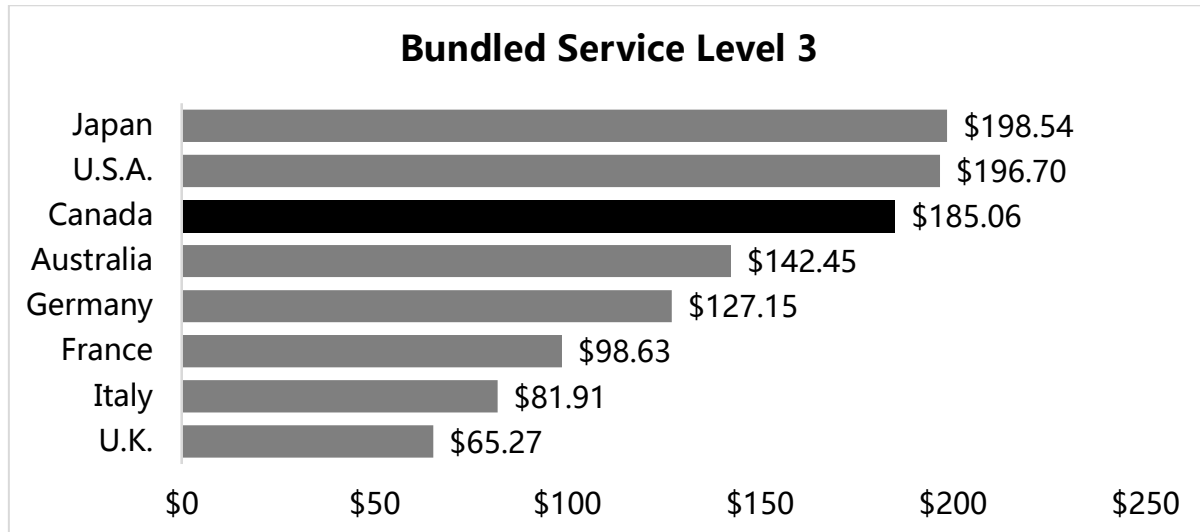
Figure 21 below provides a graphical comparison of Bundle 1, 2 and 3 services for Canada and the surveyed international jurisdictions in 2016.

Figure 21: 2016 International Bundled Service Price Comparison (PPP-adjusted CA\$)



⁴³ For example:

- Line access charges in the previous year Study were double counted when considering both Fixed Wireline Telephony services and Fixed Broadband Internet services in the same bundle (e.g. £11.75 in 2015 in UK) - this has been removed this year;
- In the current Study, single bundle prices were included. Previous year Study included individual prices of wireline, broadband and/or TV services instead of pre-made bundle prices. As a result, previous year Study prices were significantly overstated relative to those of current year Study.



Key trends in year-over-year international Bundled Services prices are summarized below:

- **Bundle 1:** The Canadian average price of \$161.63 was higher than those found in the four foreign jurisdictions, in PPP adjusted Canadian dollars. Canada had the highest price in the Bundle 1 comparison, whereas the UK had the lowest price of \$67.19. However, it is also worth noting that no surveyed providers offered Bundle 1 in Australia, France or Italy, because these providers did not offer bundles without TV packages.
- **Bundle 2:** The average Canadian bundle price of \$135.60 was in the higher end of the pricing spectrum amongst the surveyed countries, with a lower cap of \$45.17 in the UK and a higher cap of \$151.08 in Japan. All surveyed countries offered Bundle 2 at lower prices, with the only exception of Japan, which has a country average of \$151.08 in PPP adjusted Canadian dollars.
- **Bundle 3:** Canadian providers offered Bundle 3 at an average price of \$185.06, which is in the higher end amongst the average bundle prices of all surveyed jurisdictions. Similar patterns to Bundle 2 was observed in this basket, with Japan and the US offering Bundle 3 at close to \$200 PPP adjusted Canadian dollars, and UK offering the lowest price of \$65.27.

Amongst the few (only six) service providers (e.g. AT&T and Century Link in the US, Virgin in the UK, Vodafone in Germany, NTT and JCom in Japan) that offered Bundle 1, the average bundling discount was 26.4%. Greater bundling discounts were observed for Bundle 2 and Bundle 3, which have an average of 40.9% and 35.5% respectively, among the seven surveyed jurisdictions.

8. Canadian VoIP Bundle Prices

As noted above, in certain foreign (EU) jurisdictions, over-the-top (OTT) Voice (referred to as VoIP) is bundled with Fixed Broadband Internet service. VoIP currently represents 6% of wireline connections in Canada and is increasing rapidly.⁴⁴

In this context, we believe that VoIP plans bundled with Fixed Broadband Internet service will become more relevant in the price comparison calculation in future years. This analysis will become more useful with the increasing shift from traditional Public Switched Telephone Network (PSTN) voice service to VoIP services. Capturing this market segment will provide a better perspective on the availability and the pricing of these communication services to Canadians in relation to foreign jurisdictions. It will also allow more meaningful comparison of Fixed Broadband Internet prices in future. In this context, and to ensure the completeness of this Study, this section provides additional analysis on fixed broadband plus VoIP options available for Canadians.

For this purpose, we surveyed third party ISPs, such as TekSavvy and Primus, that offer OTT VoIP plans in selected cities. Our survey also included 'pure' VoIP provider – Vonage (a US-based company that offers VoIP service in Canada under the brand Vonage Canada).

Incumbents currently do not offer VoIP bundled with their Fixed Broadband Internet services. Therefore, for the purpose of this analysis, we combined the average prices of Fixed Telephony and Fixed Broadband Internet service prices available to Canadians on a standalone basis. We added Fixed Telephony Level 3 prices to the individual Fixed Broadband Internet Level 1, 2 and 3 prices. We conclude that Fixed Telephony Level 3 prices were comparable to the VoIP premium offers which include unlimited local and national long distance calling and more than two feature options.

In the second step of the analysis, we determined average VoIP prices based on premium offers of the surveyed three VoIP service providers. Then, we added the average VoIP prices to Fixed Broadband Internet service baskets level 1, 2 and 3 average prices.

In the third step, we determined average bundled (VoIP + Broadband) prices offered by the two surveyed resellers – TekSavvy and Primus in three main Canadian cities (Montreal, Toronto and Vancouver).

⁴⁴ "The number of local telephone lines is in decline. The decline is partially offset by the increase in the number of non-managed lines Access-independent VoIP (as provided by magic Jack, Ooma and others) has grown from 1.4% of wireline connections in 2010 to 6% in 2014 (primarily in the residential market) as consumers migrate to lower-cost, IP-based services." (CMR, 2015, p.174)

Table 20 below provides a summary of 2016 VoIP and Fixed Broadband Internet bundled prices, in terms of the three steps described above.

Table 20: Canadian VoIP and Fixed Broadband Internet Bundled Prices

| VoIP + Fixed Broadband Bundle | Fixed Broadband Service Level | | |
|--|-------------------------------|-----------|-----------|
| | Level 1 | Level 2 | Level 3 |
| A: Fixed Telephony Service Level 3 | \$ 60.32 | \$ 60.32 | \$ 60.32 |
| B: Fixed Broadband (2016 Average Price) | \$ 41.94 | \$ 58.88 | \$ 63.48 |
| C: VoIP Service Providers: | | | |
| Vonage | \$ 27.03 | \$ 27.03 | \$ 27.03 |
| Primus | \$ 17.97 | \$ 17.97 | \$ 17.97 |
| Teksavvy | \$ 25.59 | \$ 25.59 | \$ 25.59 |
| Unweighted Average for A, B and C | \$ 23.53 | \$ 23.53 | \$ 23.53 |
| D: Broadband and VoIP Service Providers: | | | |
| Primus | \$ 68.06 | n/a | \$ 67.06 |
| Teksavvy | \$ 55.97 | \$ 61.69 | \$ 72.35 |
| Unweighted Average for D | \$ 62.01 | \$ 61.69 | \$ 69.70 |
| E: VoIP 2016 Prices (B + C) | \$ 65.47 | \$ 82.41 | \$ 87.01 |
| F: Traditional Voice Bundle (A + B) | \$ 102.26 | \$ 119.20 | \$ 123.81 |
| Differential (E versus F) | -35.98% | -30.87% | -29.72% |
| Differential (D versus F) | -39.36% | -48.25% | -43.70% |

The table above shows a significant difference between traditional Fixed Telephony and Broadband bundle (Line 'F') versus VoIP and Fixed Broadband Internet bundle (Line 'E'). That is, consumers can save from 30% to 36% if they subscribe to OTT VoIP using the traditional Fixed Broadband Internet service Levels 1 to 3.

Fixed Wireline Broadband resellers (Primus and TekSavvy) also offer OTT VoIP along with their internet service plans as a bundle or as an add on option as shown Line 'D' in Table 20. This implies that the VoIP service offers by the resellers provide 39% to 44% saving options to the consumers.

APPENDIX A: LIST OF SERVICE PROVIDERS BY SERVICE BASKETS
Table A 1: List of Canadian Service Providers Included in the 2016 Price Comparison Study

| Cities | Service Baskets | List of Service Providers |
|--------------|--|---|
| Halifax, NS | Fixed Telephony | Bell Canada, Eastlink, Vonage, TekSavvy, Primus |
| | Fixed Broadband Internet | Bell Canada, Eastlink, TekSavvy, Primus, Vonage |
| | Mobile Wireless Telephony and text messaging | Bell Canada, TELUS, Rogers, Eastlink, PC Mobile, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |
| | Mobile Wireless Internet | Bell Canada, TELUS, Rogers, Eastlink, PC Mobile, Incumbent Flanker Brands |
| | Service Bundles | Bell Canada Aliant, Eastlink |
| Montreal, QC | Fixed Telephony | Bell, Videotron, Vonage, TekSavvy, Primus |
| | Fixed Broadband Internet | Bell, Videotron, TekSavvy, Primus |
| | Mobile Wireless Telephony and text messaging | Bell, TELUS, Rogers, Videotron, Primus, PC Mobile, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |
| | Mobile Wireless Internet | Bell, TELUS, Rogers, Videotron, Primus, PC Mobile, Incumbent Flanker Brands |
| | Service Bundles | Bell, Videotron, Primus (as applicable) |
| Toronto, ON | Fixed Telephony | Bell, Rogers, Primus, Vonage, TekSavvy |
| | Fixed Broadband Internet | Bell, Rogers, Primus, TekSavvy |
| | Mobile Wireless Telephony and text messaging | Bell, TELUS, Rogers, WIND, Primus, PC Mobile, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |
| | Mobile Wireless Internet | Bell, TELUS, Rogers, WIND, PC Mobile, Primus |
| | Service Bundles | Bell, Rogers, Primus (as applicable) |
| Winnipeg, MB | Fixed Telephony | MTS, Shaw, Vonage, TekSavvy, Primus |
| | Fixed Broadband Internet | MTS, Shaw |
| | Mobile Wireless Telephony and text messaging | MTS, TELUS, Rogers, PC Mobile, Primus, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |
| | Mobile Wireless Internet | MTS, Bell, TELUS, Rogers, Primus, PC Mobile, Incumbent Flanker Brands |
| | Service Bundles | MTS, Shaw |
| Regina, SK | Fixed Telephony | SaskTel, Access Communications, Vonage, TekSavvy, Primus |
| | Fixed Broadband Internet | SaskTel, Access Communicatio |
| | Mobile Wireless Telephony and text messaging | SaskTel, Bell, TELUS, Rogers, PC Mobile, Primus, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |

| Cities | Service Baskets | List of Service Providers |
|---------------|--|--|
| | Mobile Wireless Internet | SaskTel, Bell, TELUS, Rogers, Primus, PC Mobile, Incumbent Flanker Bands |
| | Service Bundles | SaskTel, Access Communications |
| Vancouver, BC | Fixed Telephony | TELUS, Shaw, Primus, Vonage, TekSavvy |
| | Fixed Broadband Internet | TELUS, Shaw, Primus, TekSavvy |
| | Mobile Wireless Telephony and text messaging | Bell, TELUS, Rogers, WIND, Primus, PC Mobile, Petro-Canada Mobile, 7-Eleven Speakout, Incumbent Flanker Brands |
| | Mobile Wireless Internet | Bell, TELUS, Rogers, WIND, Primus, PC Mobile, Incumbent Flanker Brands |
| | Service Bundles | TELUS, Shaw, Primus (as applicable) |

Table A 2: List of International Service Providers Included in the 2016 Price Comparison Study

| Cities | Service Baskets | List of Service Providers |
|-------------------------|--|---------------------------------|
| 1. United States | | |
| Boston, MA | Fixed Telephony | Verizon, Comcast |
| | Fixed Broadband Internet | Verizon, Comcast |
| | Mobile Wireless Telephony and text messaging | AT&T, Verizon, Sprint, T-Mobile |
| | Mobile Wireless Internet | AT&T, Verizon, Sprint, T-Mobile |
| | Service Bundles | Verizon, Comcast |
| Kansas City, MO | Fixed Telephony | AT&T, Time Warner |
| | Fixed Broadband Internet | AT&T, Time Warner |
| | Mobile Wireless Telephony and text messaging | AT&T, Verizon, Sprint, T-Mobile |
| | Mobile Wireless Internet | AT&T, Verizon, Sprint, T-Mobile |
| | Service Bundles | AT&T, Time Warner |
| Minneapolis, MN | Fixed Telephony | CenturyLink, Comcast |
| | Fixed Broadband Internet | CenturyLink, Comcast |
| | Mobile Wireless Telephony and text messaging | AT&T, Verizon, Sprint, T-Mobile |
| | Mobile Wireless Internet | AT&T, Verizon, Sprint, T-Mobile |
| | Service Bundles | CenturyLink/Verizon, Comcast |
| Seattle, WA | Fixed Telephony | CenturyLink, Comcast |
| | Fixed Broadband Internet | CenturyLink, Comcast |
| | Mobile Wireless Telephony and text messaging | AT&T, Verizon, Sprint, T-Mobile |
| | Mobile Wireless Internet | AT&T, Verizon, Sprint, T-Mobile |
| | Service Bundles | CenturyLink/Verizon, Comcast |

| Cities | Service Baskets | List of Service Providers |
|--------------------------|--|--|
| 2. Australia | | |
| Sydney | Fixed Telephony | Telstra and Optus |
| | Fixed Broadband Internet | Telstra and Optus |
| | Mobile Wireless Telephony and text messaging | Telstra and Optus |
| | Mobile Wireless Internet | Telstra and Optus |
| | Service Bundles | Telstra and Optus |
| 3. United Kingdom | | |
| London | Fixed Telephony | BT, Virgin, Talk Talk ⁴⁵ |
| | Fixed Broadband Internet | BT, Virgin, EE, AOL |
| | Mobile Wireless Telephony and text messaging | EE, Virgin Mobile, Vodafone, O2, 3 (three) ⁴⁶ |
| | Mobile Wireless Internet | EE, Virgin Mobile, Vodafone, O2, 3 (three) |
| | Service Bundles | BT (EE), 2 Virgin |
| 4. France | | |
| Paris | Fixed Telephony | Orange (France Telecom), Numericable, SFR ⁴⁷ |
| | Fixed Broadband Internet | Orange (France Telecom), Numericable, SFR ⁴⁸ |
| | Mobile Wireless Telephony and Text messaging | Orange, Numericable, SFR, Bouygues Telecom |
| | Mobile Wireless Internet | Orange, Numericable, SFR, Bouygues Telecom |
| | Service Bundles | Orange, Numericable, SFR |
| 5. Italy | | |
| Rome | Fixed Telephony | Telecom Italia, FastWeb |
| | Fixed Broadband Internet | Telecom Italia, FastWeb |
| | Mobile Wireless Telephony and text messaging | Telecom Italia (TIM), Vodafone, WIND |
| | Mobile Wireless Internet | Telecom Italia (TIM), Vodafone, WIND |
| | Service Bundles | Telecom Italia, FastWeb |

⁴⁵ Talk Talk website has been out of commission for the past two months. Survey team for this Study could not contact its representative despite several attempted phone calls.

⁴⁶ Both O2 and 3 (three) own substantial market share in the UK in the mobile wireless (voice and data) services. Nordicity is cognizant of the proposed combination of O2 and 3 (three), currently under review by the European Commission's competition authority.

⁴⁷ SFR was acquired by Numericable (www.numericable-sfr.com).

⁴⁸ SFR was acquired by Numericable (www.numericable-sfr.com).

| Cities | Service Baskets | List of Service Providers |
|-------------------|--|---|
| 6. Germany | | |
| Berlin | Fixed Telephony | Deutsche Telekom (DT), Vodafone/KD ⁴⁹ |
| | Fixed Broadband Internet | DT, Vodafone/KD |
| | Mobile Wireless Telephony and text messaging | DT, Vodafone, E-plus (KPN), O2 |
| | Mobile Wireless Internet | DT, Vodafone, E-plus (KPN) |
| | Service Bundles | DT, Vodafone/KD |
| 7. Japan | | |
| Tokyo | Fixed Telephony | NTT, J:Com |
| | Fixed Broadband Internet | NTT, J:Com, KDDI, Yahoo! BB |
| | Mobile Wireless Telephony and text messaging | NTT DoCoMo, Softbank, au KDDI, Y!Mobile ⁵⁰ |
| | Mobile Wireless Internet | NTT DoCoMo, Softbank, au KDDI, Y!Mobile |
| | Service Bundles | NTT, J:Com (au KDDI) |

⁴⁹ KD and Vodafone Germany have merged their operations.

⁵⁰ Previously branded as eMobile.

APPENDIX B: SERVICE BASKETS
Table B. 1: Fixed (Wireline) Telephony Service Baskets

| Key Elements | Level 1 | Level 2 | Level 3 |
|---|------------|--------------|--------------|
| Incoming minutes per month (45%) | 180 | 450 | 720 |
| Outgoing minutes per month (55%) | 220 | 550 | 880 |
| Outgoing minutes per month | 198 | 440 | 616 |
| Outgoing Long distance minutes | 22 | 110 | 264 |
| Total minutes per month | 400 | 1,000 | 1,600 |
| Long distance to total outgoing ratio | 10% | 20% | 30% |
| Voice Mail | No | Yes | Yes |
| Caller ID | No | Yes | Yes |
| Additional features (two additional or bundled, if available) | No | No | Yes |

Table B. 2: Mobile Wireless Telephony and text Messaging Service Baskets

| Key Elements | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 | Level 6 |
|---|------------|------------|--------------|------------|------------|------------|
| Incoming minutes per month | 60 | 180 | 480 | Ult | Ult | Ult |
| Outgoing minutes per month | 90 | 270 | 720 | Ult | Ult | Ult |
| Outgoing minutes per month | 81 | 243 | 612 | Ult | Ult | Ult |
| Outgoing Long distance minutes | 9 | 27 | 108 | Ult | Ult | Ult |
| Total minutes per month | 150 | 450 | 1,200 | Ult | Ult | Ult |
| Long distance to total outgoing ratio | 10% | 10% | 15% | n/a | n/a | n/a |
| Voice Mail | No | Yes | Yes | Yes | Yes | Yes |
| Caller ID | No | Yes | Yes | Yes | Yes | Yes |
| Other Feature(s) | No | No | Yes | Yes | Yes | Yes |
| TMS | No | 300 | 300 | Ult | Ult | Ult |
| Data | No | No | 1 GB | 2 GB | 5 GB | 10 GB * |
| Ult: Unlimited nationwide talk and text, excluding international calling n/a: not applicable * Shared data plan among three lines | | | | | | |

Table B. 3: Fixed Broadband Internet Service Baskets

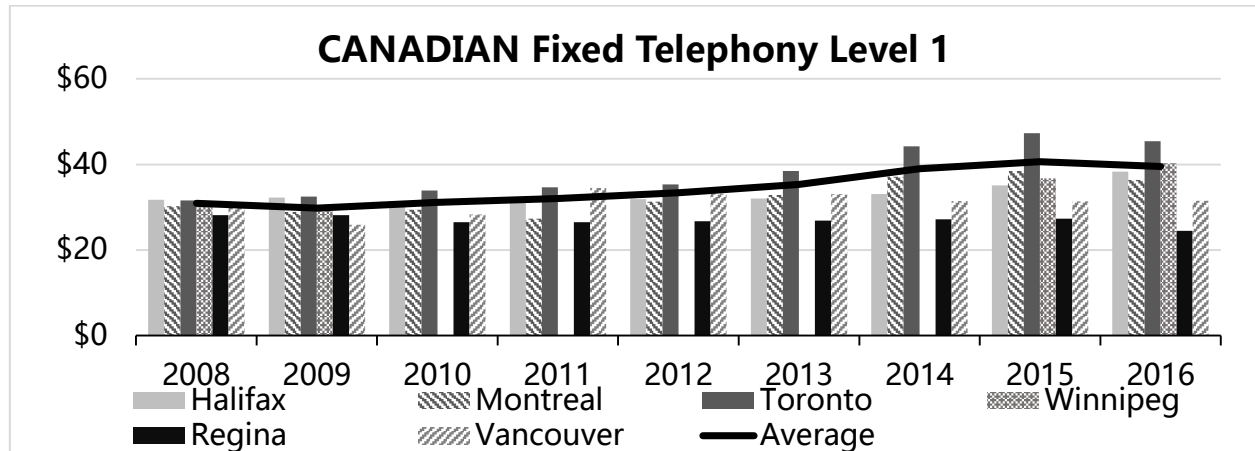
| Key Elements | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|--|----------|----------|----------|-----------|----------|
| Download Speed Range (Mbps) | 3 to 9 | 10 to 15 | 16 to 40 | 41 to 100 | > 100 |
| Monthly Usage | 10 GB | 50 GB | 100 GB | 150 GB | 500 GB |
| Modem | FWC or R | FWC or R | FWC or R | FWC or R | FWC or R |
| FWC: Free with contract R: Monthly rental or amortization (24 months) | | | | | |

Table B. 4: Mobile Wireless (Broadband) Internet Service Baskets

| Key Elements | Level 1 | Level 2 | Level 3 |
|--|----------|----------|----------|
| Download Speed Range (Mbps) | ≥ 1.5 | ≥ 1.5 | ≥ 1.5 |
| Monthly Usage | 2 GB | 5 GB | 10 GB |
| Modem | FWC or R | FWC or R | FWC or R |
| FWC: Free with contract R: Monthly rental or amortization (24 months) | | | |

Table B. 5: Bundled Service Baskets

| Key Elements | Level 1 | Level 2 | Level 3 |
|---------------------------|---------|------------------|------------------|
| Fixed Telephony | Level 2 | Level 2 | Level 2 |
| Mobile Wireless Telephony | Level 2 | | Level 2 |
| Fixed Broadband Internet | Level 2 | Level 2 | Level 2 |
| Television Package | | Basic Digital TV | Basic Digital TV |

APPENDIX C: CANADIAN PRICE COMPARISONS
Figure C.1.1: Canadian Fixed Telephony Service Level 1

Table C.1.1 Canadian Fixed Telephony Service

Level 1: 400 Minutes with 10% LD

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2008 | \$31.73 | \$30.27 | \$31.61 | \$30.49 | \$28.16 | \$30.90 | \$30.88 | n/a |
| 2009 | \$32.23 | \$28.92 | \$32.51 | \$30.48 | \$28.16 | \$25.92 | \$29.80 | -3.5% |
| 2010 | \$30.08 | \$29.39 | \$33.88 | n/a | \$26.49 | \$28.27 | \$31.16 | 4.6% |
| 2011 | \$31.79 | \$27.33 | \$34.63 | n/a | \$26.52 | \$34.52 | \$32.06 | 2.9% |
| 2012 | \$31.89 | \$31.31 | \$35.30 | n/a | \$26.76 | \$33.16 | \$33.42 | 4.2% |
| 2013 | \$32.04 | \$32.85 | \$38.45 | n/a | \$26.86 | \$33.12 | \$35.33 | 5.7% |
| 2014 | \$33.06 | \$37.10 | \$44.24 | n/a | \$27.17 | \$31.45 | \$38.99 | 10.4% |
| 2015 | \$35.07 | \$38.47 | \$47.30 | \$36.73 | \$27.34 | \$31.39 | \$40.64 | 4.2% |
| 2016 | \$38.29 | \$36.41 | \$45.42 | \$40.30 | \$24.50 | \$31.55 | \$39.52 | -2.8% |
| CAGR | 2.4% | 2.3% | 4.6% | 3.5% | -1.7% | 0.3% | 3.1% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
 n/a: not available
 YoY: Year over Year Change

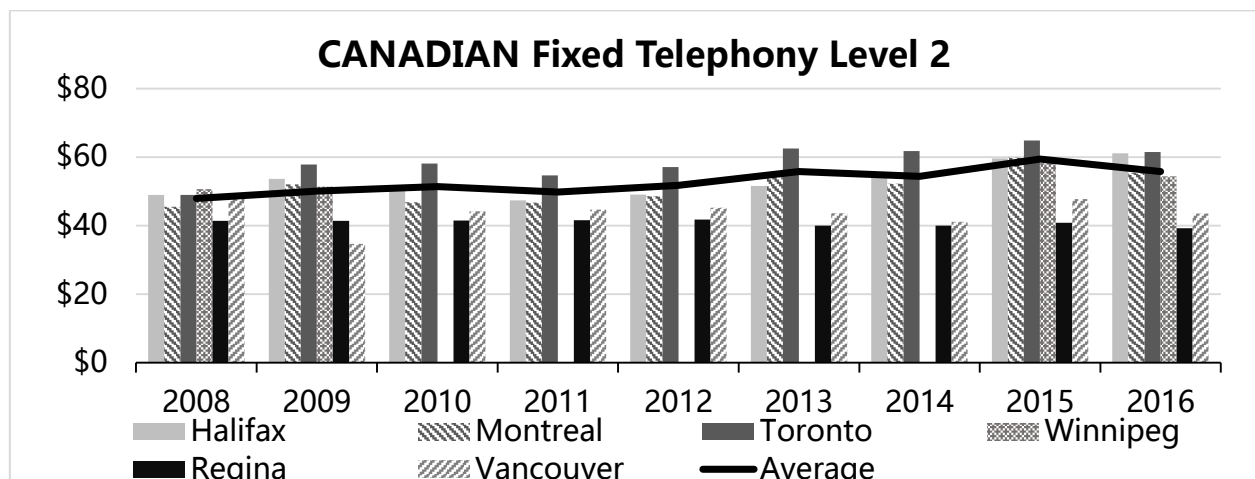
Figure C.1.2: Canadian Fixed Telephony Service Level 2


Table C.1.2 Canadian Fixed Telephony Service

Level 2: 1,000 Minutes with 20% LD

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2008 | \$48.93 | \$45.44 | \$48.96 | \$50.61 | \$41.39 | \$48.67 | \$47.91 | n/a |
| 2009 | \$53.61 | \$52.01 | \$57.78 | \$51.35 | \$41.39 | \$34.68 | \$50.05 | 4.5% |
| 2010 | \$50.78 | \$46.81 | \$58.09 | n/a | \$41.50 | \$44.18 | \$51.42 | 2.7% |
| 2011 | \$47.34 | \$46.72 | \$54.66 | n/a | \$41.52 | \$44.62 | \$49.81 | -3.1% |
| 2012 | \$49.05 | \$48.55 | \$57.08 | n/a | \$41.71 | \$45.19 | \$51.71 | 3.8% |
| 2013 | \$51.56 | \$54.58 | \$62.50 | n/a | \$39.94 | \$43.63 | \$55.77 | 7.9% |
| 2014 | \$55.19 | \$52.26 | \$61.77 | n/a | \$39.97 | \$41.11 | \$54.37 | -2.5% |
| 2015 | \$59.57 | \$59.83 | \$64.88 | \$58.23 | \$40.81 | \$47.69 | \$59.44 | 9.3% |
| 2016 | \$61.07 | \$55.43 | \$61.49 | \$54.35 | \$39.20 | \$43.56 | \$55.78 | -6.2% |
| CAGR | 2.8% | 2.5% | 2.9% | 0.9% | -0.7% | -1.4% | 1.9% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.1.3: Canadian Fixed Telephony Service Level 3

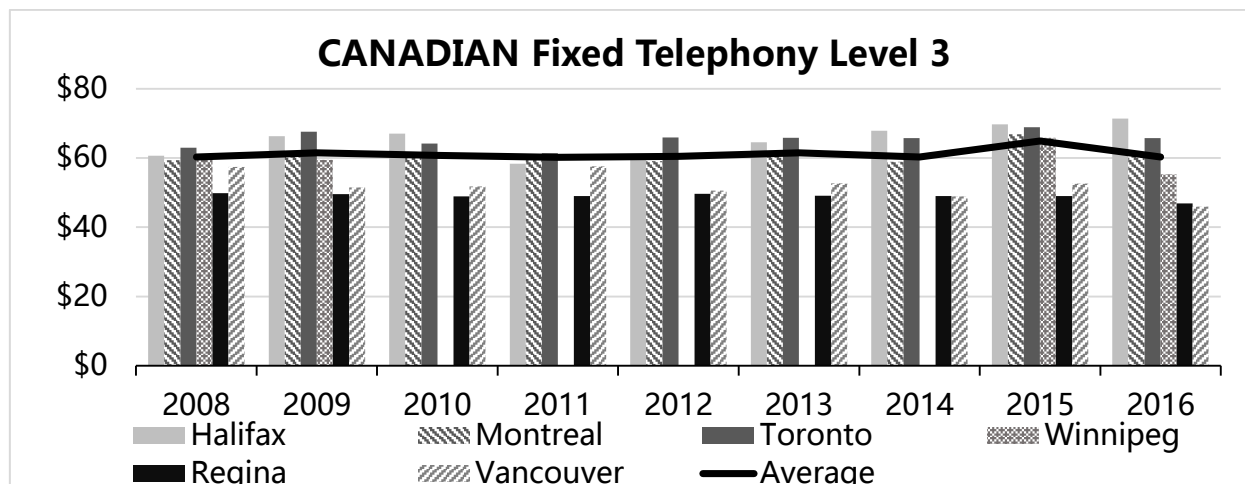


Table C.1.3: Canadian Fixed Telephony Service

Level 3: 1,600 Minutes with 30% LD

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2008 | \$60.63 | \$59.36 | \$63.02 | \$60.47 | \$49.81 | \$57.45 | \$60.27 | n/a |
| 2009 | \$66.34 | \$61.68 | \$67.59 | \$59.47 | \$49.56 | \$51.51 | \$61.55 | 2.1% |
| 2010 | \$67.02 | \$61.15 | \$64.19 | n/a | \$48.96 | \$51.79 | \$60.78 | -1.3% |
| 2011 | \$58.35 | \$60.97 | \$61.36 | n/a | \$48.99 | \$57.59 | \$60.22 | -0.9% |
| 2012 | \$60.33 | \$59.08 | \$65.97 | n/a | \$49.66 | \$50.62 | \$60.52 | 0.5% |
| 2013 | \$64.58 | \$60.94 | \$65.84 | n/a | \$49.11 | \$52.69 | \$61.53 | 1.7% |
| 2014 | \$67.85 | \$58.95 | \$65.80 | n/a | \$49.03 | \$48.91 | \$60.29 | -2.0% |
| 2015 | \$69.70 | \$66.89 | \$68.89 | \$65.87 | \$48.98 | \$52.66 | \$64.96 | 7.7% |
| 2016 | \$71.38 | \$61.60 | \$65.77 | \$55.29 | \$46.91 | \$45.98 | \$60.32 | -7.1% |
| CAGR | 2.1% | 0.5% | 0.5% | -1.1% | -0.7% | -2.7% | 0.0% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.2.1: Canadian Wireless Telephony and Text Messaging Service Level 1

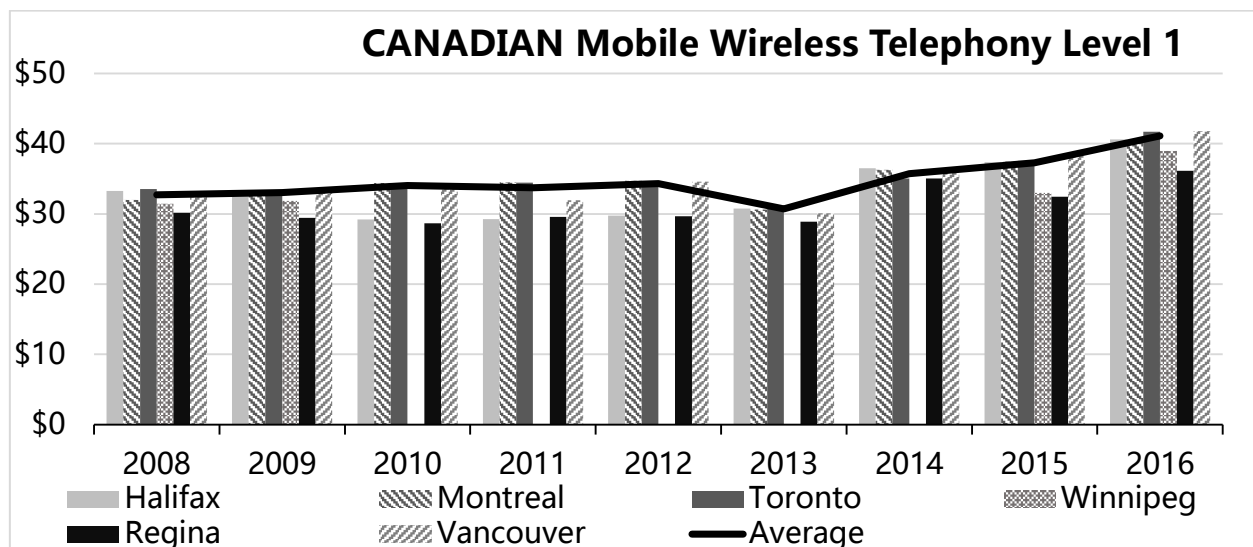


Table C.2.1: Canadian Wireless Telephony and Text Messaging Service

Level 1: 150 Minutes

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2008 | \$33.25 | \$31.96 | \$33.55 | \$31.44 | \$30.16 | \$32.90 | \$32.73 | n/a |
| 2009 | \$32.48 | \$33.24 | \$33.34 | \$31.85 | \$29.44 | \$33.32 | \$33.03 | 0.9% |
| 2010 | \$29.23 | \$34.38 | \$34.33 | n/a | \$28.64 | \$34.10 | \$34.03 | 3.0% |
| 2011 | \$29.24 | \$34.47 | \$34.45 | n/a | \$29.59 | \$31.94 | \$33.73 | -0.9% |
| 2012 | \$29.75 | \$34.72 | \$34.44 | n/a | \$29.66 | \$34.58 | \$34.32 | 1.8% |
| 2013 | \$30.76 | \$30.63 | \$31.09 | n/a | \$28.88 | \$30.06 | \$30.71 | -10.5% |
| 2014 | \$36.50 | \$36.28 | \$35.04 | n/a | \$35.05 | \$36.29 | \$35.70 | 16.3% |
| 2015 | \$37.37 | \$37.46 | \$37.54 | \$32.98 | \$32.43 | \$38.21 | \$37.29 | 4.4% |
| 2016 | \$40.62 | \$40.46 | \$41.71 | \$38.98 | \$36.12 | \$41.79 | \$41.08 | 10.2% |
| CAGR | 2.5% | 3.0% | 2.8% | 2.7% | 2.3% | 3.0% | 2.9% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.2.2: Canadian Wireless Telephony and Text Messaging Service Level 2

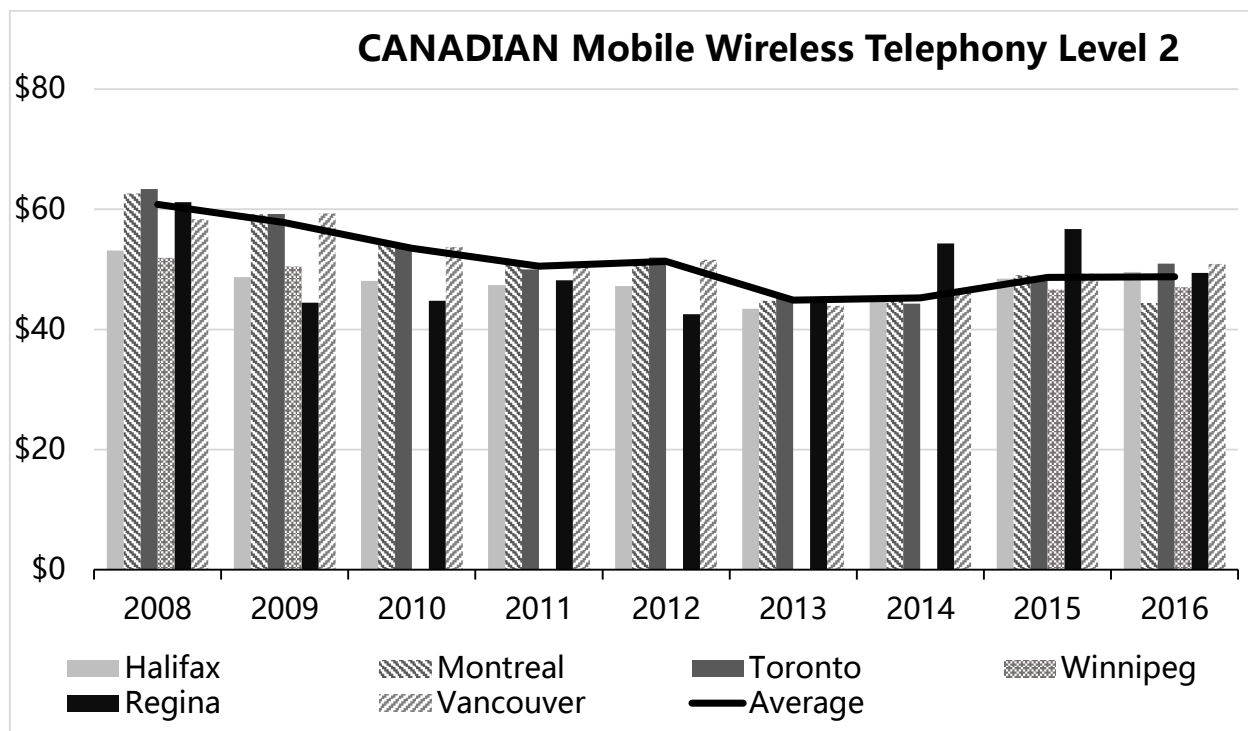


Table C.2.2: Canadian Wireless Telephony and Text Messaging Service

Level 2: 450 Minutes and 300 TMS

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2008 | \$53.14 | \$62.62 | \$63.37 | \$51.91 | \$61.20 | \$58.34 | \$60.81 | n/a |
| 2009 | \$48.73 | \$59.17 | \$59.20 | \$50.49 | \$44.44 | \$59.30 | \$57.78 | -5.0% |
| 2010 | \$48.05 | \$54.34 | \$53.56 | n/a | \$44.77 | \$53.74 | \$53.49 | -7.4% |
| 2011 | \$47.39 | \$51.50 | \$49.99 | n/a | \$48.19 | \$50.86 | \$50.51 | -5.6% |
| 2012 | \$47.22 | \$51.04 | \$51.97 | n/a | \$42.54 | \$51.61 | \$51.31 | 1.6% |
| 2013 | \$43.44 | \$44.78 | \$45.40 | n/a | \$44.86 | \$43.93 | \$44.86 | -12.6% |
| 2014 | \$45.40 | \$45.59 | \$44.29 | n/a | \$54.29 | \$46.20 | \$45.26 | 0.9% |
| 2015 | \$48.45 | \$49.04 | \$48.15 | \$46.65 | \$56.70 | \$49.28 | \$48.68 | 7.6% |
| 2016 | \$49.56 | \$44.39 | \$50.96 | \$46.98 | \$49.38 | \$50.89 | \$48.77 | 0.2% |
| CAGR | -0.9% | -4.2% | -2.7% | -1.2% | -2.6% | -1.7% | -2.7% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.2.3: Canadian Wireless Telephony and Text Messaging Service Level 3

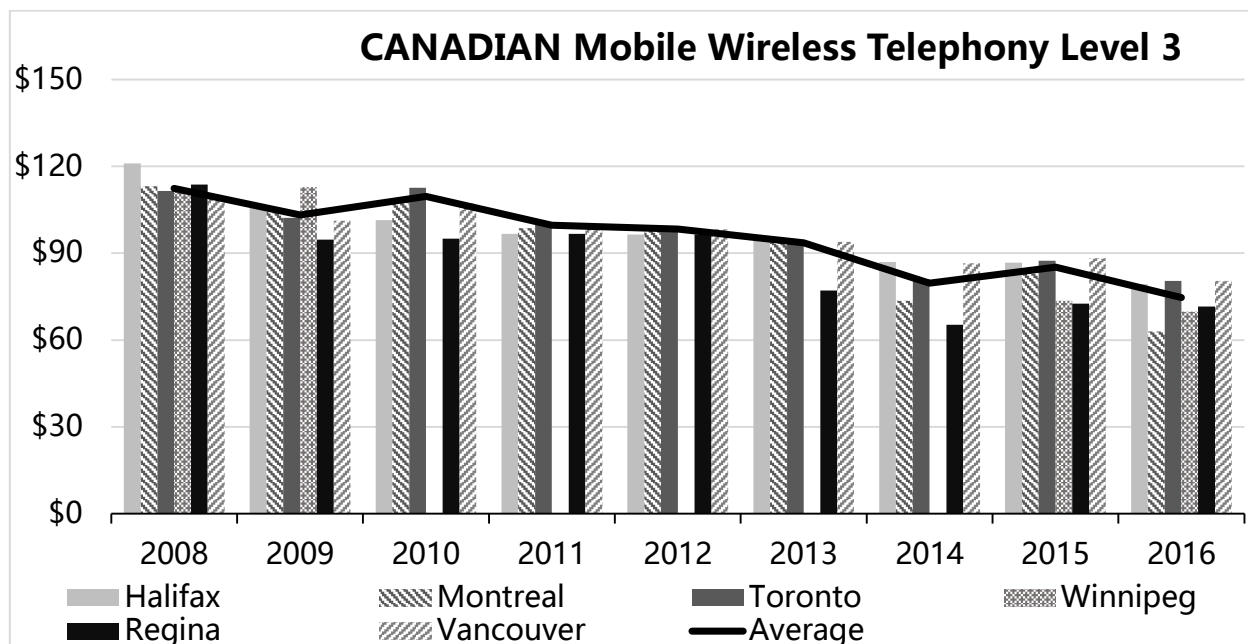


Table C.2.3: Canadian Wireless Telephony and Text Messaging Service

Level 3: 1,200 Minutes, 300 TMS and 1 GB Data

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|----------|--------|
| 2008 | \$121.04 | \$113.21 | \$111.51 | \$111.51 | \$113.67 | \$109.68 | \$112.34 | n/a |
| 2009 | \$105.61 | \$104.38 | \$102.20 | \$112.82 | \$94.64 | \$101.24 | \$103.24 | -8.1% |
| 2010 | \$101.44 | \$108.37 | \$112.63 | n/a | \$94.97 | \$107.27 | \$109.59 | 6.2% |
| 2011 | \$96.73 | \$98.73 | \$100.76 | n/a | \$96.69 | \$99.61 | \$99.69 | -9.0% |
| 2012 | \$96.44 | \$98.92 | \$98.26 | n/a | \$96.42 | \$98.22 | \$98.37 | -1.3% |
| 2013 | \$94.40 | \$93.78 | \$93.89 | n/a | \$77.07 | \$93.96 | \$93.59 | -4.9% |
| 2014 | \$86.91 | \$73.59 | \$81.00 | n/a | \$65.33 | \$86.46 | \$79.69 | -14.9% |
| 2015 | \$86.76 | \$82.96 | \$87.36 | \$73.54 | \$72.56 | \$88.32 | \$85.22 | 6.9% |
| 2016 | \$79.29 | \$62.98 | \$80.48 | \$69.86 | \$71.59 | \$80.48 | \$74.67 | -12.4% |
| CAGR | -5.1% | -7.1% | -4.0% | -5.7% | -5.6% | -3.8% | -5.0% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016

n/a: not available

YoY: Year over Year Change

Figure C.2.4: Canadian Wireless Telephony and Text Messaging Service Level 4

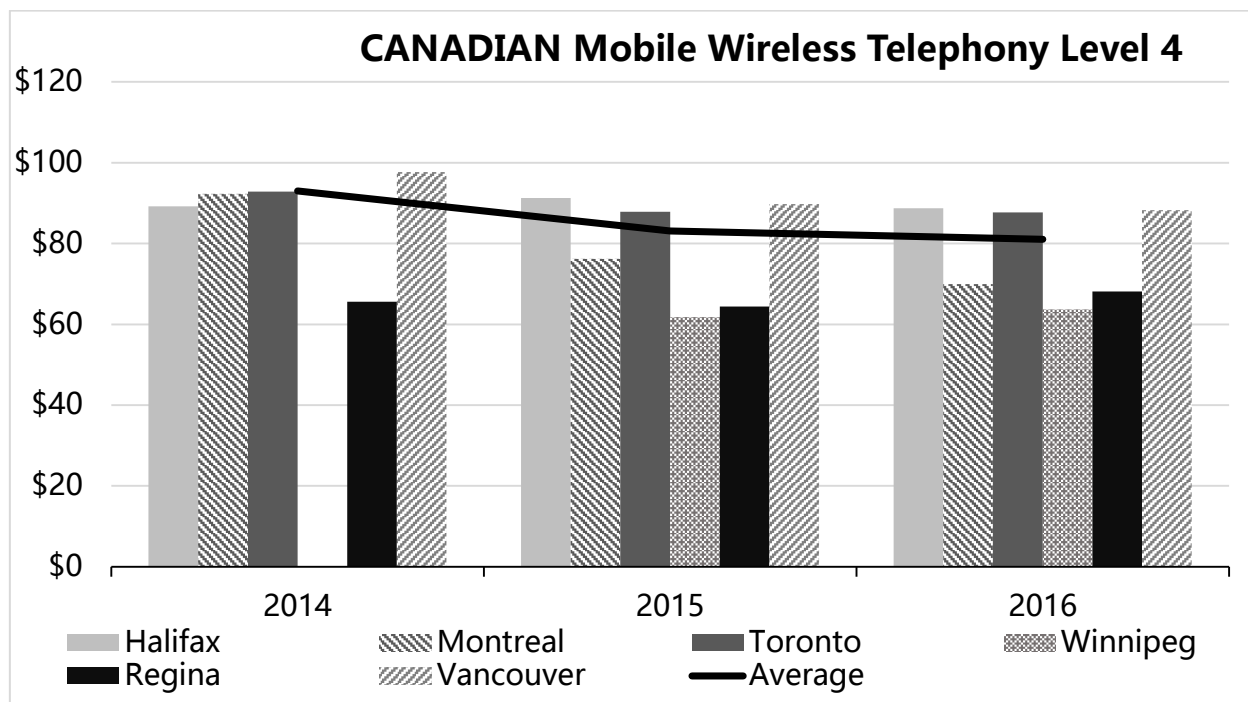


Table C.2.4: Canadian Wireless Telephony and Text Messaging Service

Level 4: Unlimited Minutes, TMS and 2 GB Data

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2014 | \$89.23 | \$92.29 | \$92.81 | n/a | \$65.62 | \$97.69 | \$92.99 | n/a |
| 2015 | \$91.23 | \$76.22 | \$87.83 | \$61.82 | \$64.43 | \$89.78 | \$83.08 | -10.7% |
| 2016 | \$88.73 | \$69.98 | \$87.69 | \$63.69 | \$68.15 | \$88.24 | \$81.05 | -2.4% |
| CAGR | -0.3% | -12.9% | -2.8% | 3.0% | 1.9% | -5.0% | -6.6% | n/a |

CAGR: Compound Annual Growth Rate from 2014 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.2.5: Canadian Wireless Telephony and Text Messaging Service Level 5

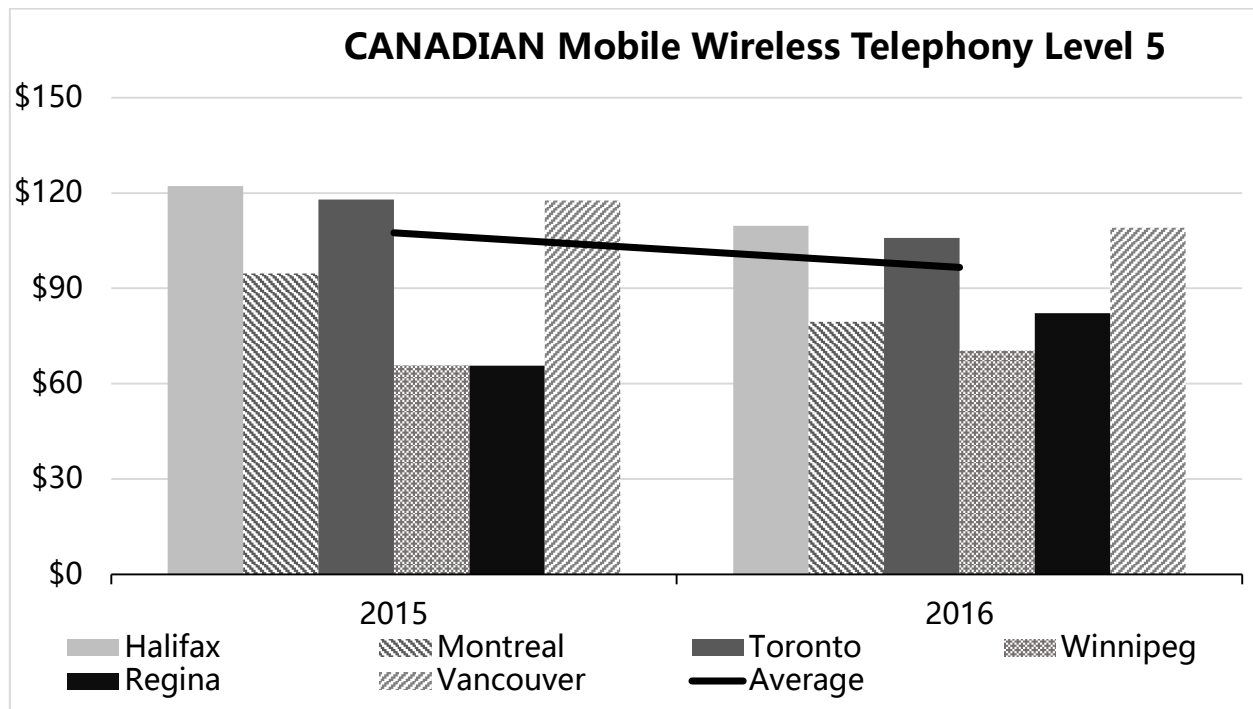


Table C.2.5: Canadian Wireless Telephony and Text Messaging Service

Level 5: Unlimited Minutes, TMS and 5 GB Data

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|---------|-----------|----------|--------|
| 2015 | \$122.21 | \$94.67 | \$117.93 | \$65.76 | \$65.62 | \$117.65 | \$107.50 | n/a |
| 2016 | \$109.64 | \$79.44 | \$105.81 | \$70.38 | \$82.15 | \$109.11 | \$96.55 | -10.2% |
| CAGR | -10.3% | -16.1% | -10.3% | 7.0% | 25.2% | -7.3% | -10.2% | n/a |

CAGR: Compound Annual Growth Rate from 2015 to 2016

n/a: not available

YoY: Year over Year Change

Figure C.2.6: Canadian Wireless Telephony and Text Messaging Service Level 6

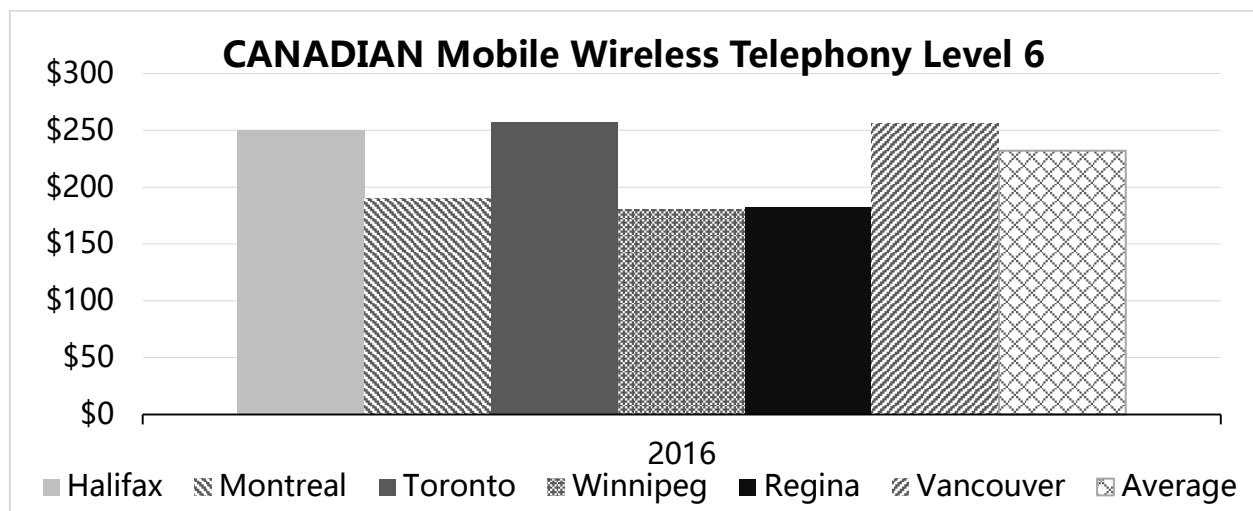


Table C.2.6: Canadian Wireless Telephony and Text Messaging Service

Level 6: Unlimited Minutes, TMS and 10 GB Data with 3 Lines

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|----------|-------|
| 2016 | \$250.18 | \$190.40 | \$257.18 | \$180.00 | \$182.44 | \$256.00 | \$231.99 | n/a |

n/a: not available
YoY: Year over Year Change

Figure C.3.1 Canadian Fixed Broadband Internet Service Level 1

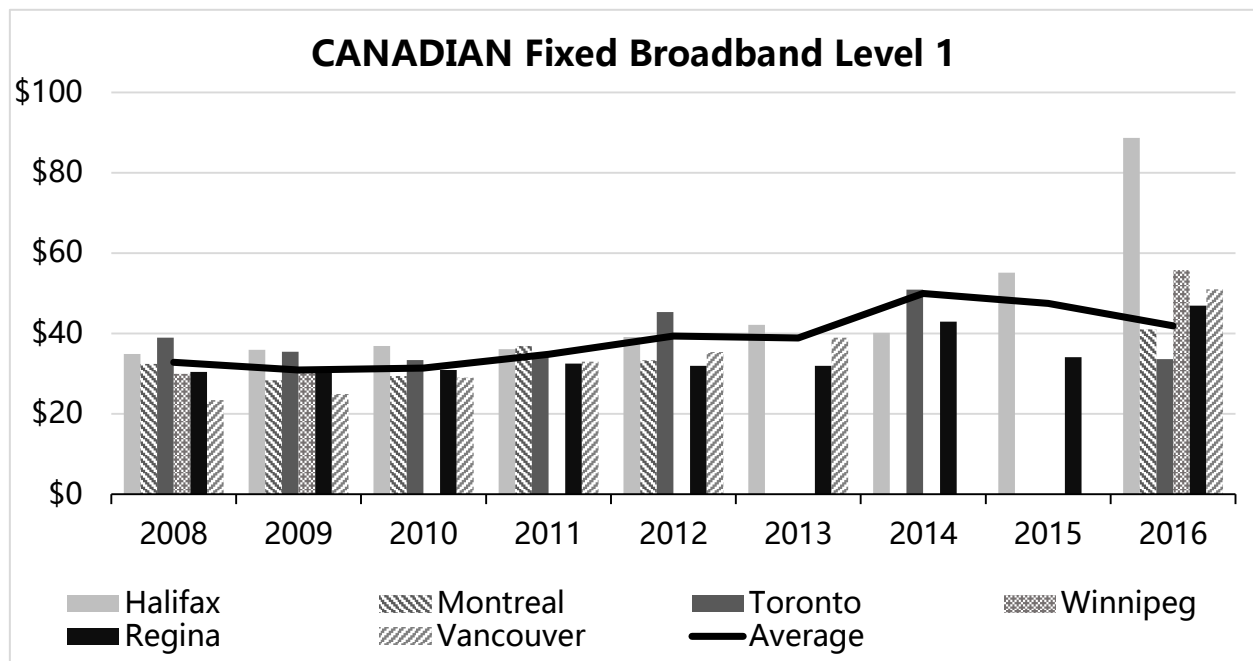


Table C.3.1: Canadian Fixed Broadband Internet Service Prices

Level 1: 3 to 9 Mbps

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2008 | \$34.95 | \$32.45 | \$38.95 | \$29.95 | \$30.45 | \$23.45 | \$32.88 | n/a |
| 2009 | \$35.95 | \$28.43 | \$35.45 | \$30.95 | \$30.45 | \$24.95 | \$30.98 | -5.8% |
| 2010 | \$36.95 | \$29.43 | \$33.45 | n/a | \$30.95 | \$29.00 | \$31.44 | 1.5% |
| 2011 | \$36.15 | \$36.90 | \$34.15 | n/a | \$32.52 | \$33.00 | \$34.85 | 10.9% |
| 2012 | \$39.15 | \$33.35 | \$45.37 | n/a | \$31.95 | \$35.40 | \$39.37 | 13.0% |
| 2013 | \$42.15 | n/a | n/a | n/a | \$31.95 | \$39.00 | \$38.91 | -1.2% |
| 2014 | \$40.15 | n/a | \$50.95 | n/a | \$42.95 | n/a | \$50.00 | 28.5% |
| 2015 | \$55.13 | n/a | n/a | n/a | \$34.10 | n/a | \$47.51 | -5.0% |
| 2016 | \$88.73 | \$41.07 | \$33.63 | \$55.80 | \$46.95 | \$51.00 | \$41.94 | -11.7% |
| CAGR | 12.4% | 3.0% | -1.8% | 8.1% | 5.6% | 10.2% | 3.1% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016

n/a: not available

YoY: Year over Year Change

Figure C.3.2 Canadian Fixed Broadband Internet Service Level 2

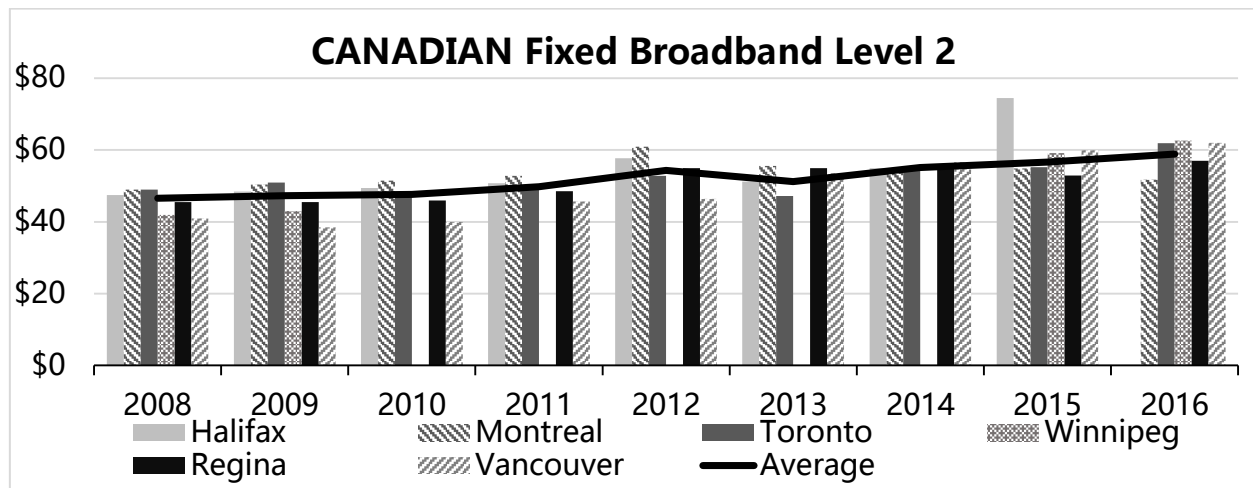


Table C.3.2 Canadian Fixed Broadband Internet Service

Level 2: 10 to 15 Mbps

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2008 | \$47.45 | \$48.95 | \$48.95 | \$41.95 | \$45.45 | \$40.95 | \$46.58 | n/a |
| 2009 | \$48.45 | \$50.43 | \$50.95 | \$42.95 | \$45.45 | \$38.45 | \$47.26 | 1.5% |
| 2010 | \$49.45 | \$51.43 | \$47.95 | n/a | \$45.95 | \$40.00 | \$47.60 | 0.7% |
| 2011 | \$50.75 | \$52.83 | \$49.33 | n/a | \$48.52 | \$45.65 | \$49.79 | 4.6% |
| 2012 | \$57.75 | \$60.92 | \$52.79 | n/a | \$54.95 | \$46.40 | \$54.31 | 9.1% |
| 2013 | \$51.15 | \$55.60 | \$47.18 | n/a | \$54.95 | \$53.51 | \$51.20 | -5.7% |
| 2014 | \$54.95 | \$53.91 | \$55.25 | n/a | \$54.95 | \$56.68 | \$55.10 | 7.6% |
| 2015 | \$74.45 | \$54.83 | \$55.17 | \$59.17 | \$52.88 | \$59.90 | \$56.66 | 2.8% |
| 2016 | n/a | \$51.75 | \$61.92 | \$62.60 | \$56.95 | \$62.00 | \$58.88 | 3.9% |
| CAGR | 6.6% | 0.7% | 3.0% | 5.1% | 2.9% | 5.3% | 3.0% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016

n/a: not available

YoY: Year over Year Change

Figure C.3.3 Canadian Fixed Broadband Internet Service Level 3

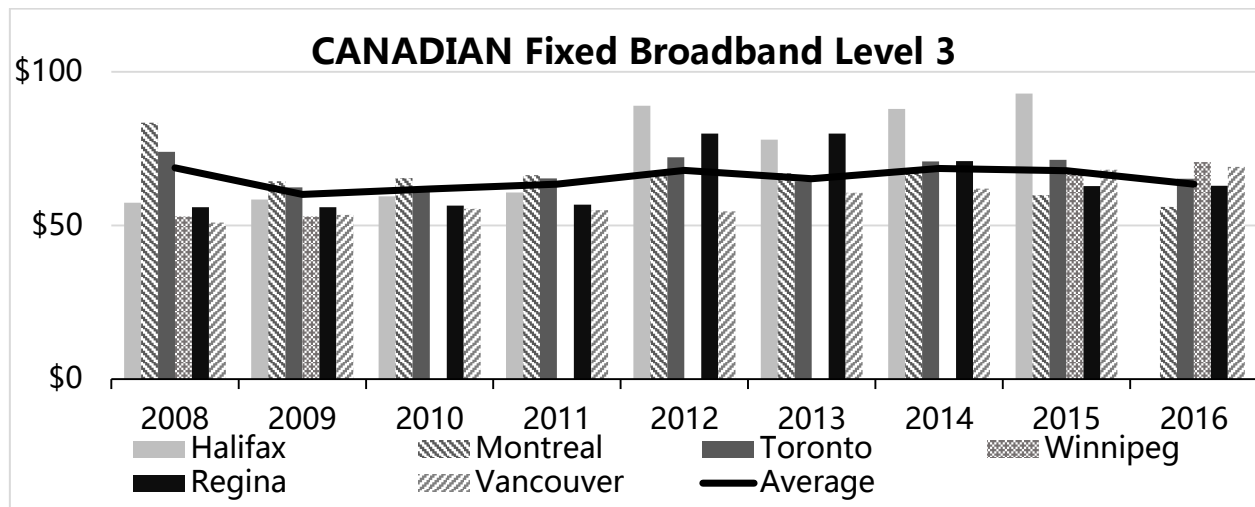


Table C. 3.3 Canadian Fixed Broadband Internet Service

Level 3: 16 to 40 Mbps

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2008 | \$57.45 | \$83.45 | \$73.95 | \$52.95 | \$55.95 | \$50.95 | \$68.74 | n/a |
| 2009 | \$58.45 | \$64.40 | \$62.45 | \$52.95 | \$55.95 | \$53.45 | \$60.08 | -12.6% |
| 2010 | \$59.45 | \$65.40 | \$62.45 | n/a | \$56.45 | \$55.48 | \$61.88 | 3.0% |
| 2011 | \$60.75 | \$66.33 | \$65.35 | n/a | \$56.75 | \$55.00 | \$63.44 | 2.5% |
| 2012 | \$88.95 | \$66.95 | \$72.17 | n/a | \$79.95 | \$54.60 | \$67.94 | 7.1% |
| 2013 | \$77.95 | \$67.05 | \$64.35 | n/a | \$79.95 | \$60.69 | \$65.18 | -4.1% |
| 2014 | \$87.95 | \$67.15 | \$70.87 | n/a | \$70.95 | \$62.00 | \$68.60 | 5.3% |
| 2015 | \$92.95 | \$59.93 | \$71.39 | \$67.93 | \$62.88 | \$68.17 | \$67.81 | -1.2% |
| 2016 | n/a | \$56.09 | \$65.20 | \$70.60 | \$62.95 | \$69.06 | \$63.48 | -6.4% |
| CAGR | 7.1% | -4.8% | -1.6% | 3.7% | 1.5% | 3.9% | -1.0% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C.3.4 Canadian Fixed Broadband Internet Service Level 4

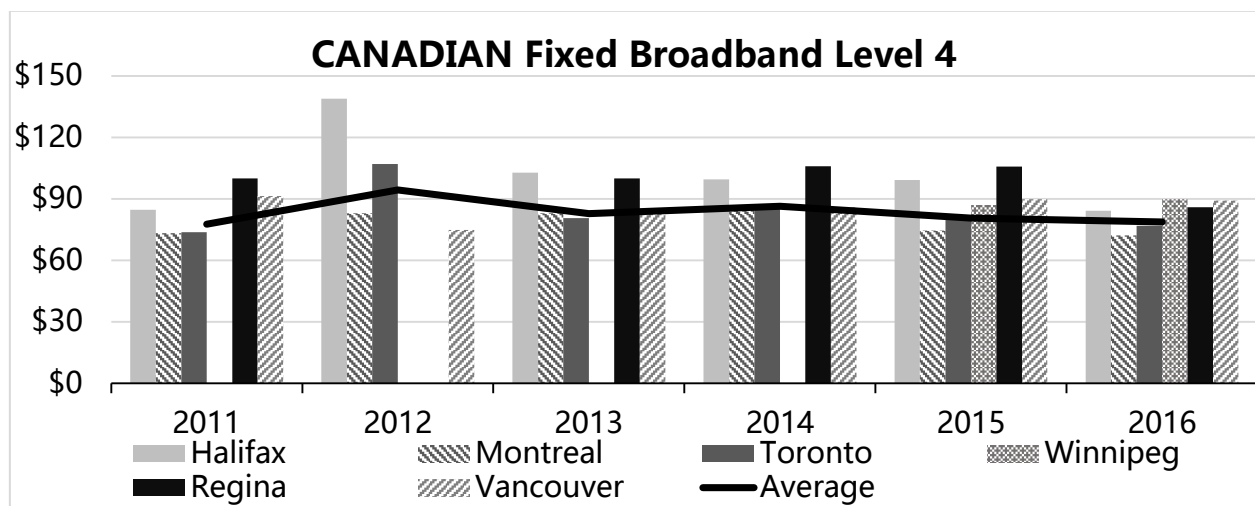


Table C.3.4 Canadian Fixed Broadband Internet Service

Level 4: 41 to 100 Mbps

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|---------|--------|
| 2011 | \$84.75 | \$73.30 | \$73.75 | n/a | \$99.95 | \$91.40 | \$77.71 | n/a |
| 2012 | \$138.95 | \$82.95 | \$106.98 | n/a | n/a | \$74.90 | \$94.39 | 21.5% |
| 2013 | \$102.75 | \$82.95 | \$80.57 | n/a | \$99.95 | \$85.00 | \$82.88 | -12.2% |
| 2014 | \$99.55 | \$84.75 | \$86.87 | n/a | \$105.95 | \$86.00 | \$86.46 | 4.3% |
| 2015 | \$99.26 | \$74.51 | \$79.68 | \$87.10 | \$105.80 | \$89.79 | \$80.63 | -6.7% |
| 2016 | \$84.17 | \$72.21 | \$76.80 | \$89.80 | \$85.95 | \$89.16 | \$78.77 | -2.3% |
| CAGR | -0.1% | -0.3% | 0.8% | 3.1% | -3.0% | -0.5% | 0.3% | n/a |

CAGR: Compound Annual Growth Rate from 2011 to 2016
n/a: not available
YoY: Year over Year Change

Figure C. 3.5 Canadian Fixed Broadband Internet Service Level 5

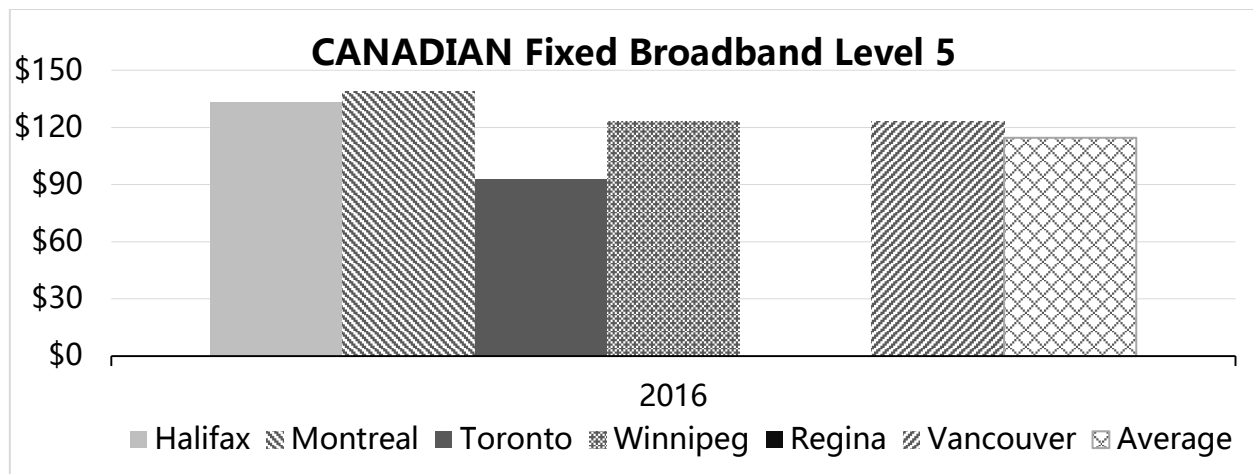


Table C.3.5 Canadian Fixed Broadband Internet Service

Level 5: Over 100 Mbps

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|---------|----------|--------|-----------|----------|-------|
| 2016 | \$133.10 | \$138.80 | \$92.91 | \$123.00 | n/a | \$123.00 | \$114.65 | n/a |

n/a: not available
YoY: Year over Year Change

Table C. 4: Canadian Fixed Broadband Internet Rates – Incumbents versus Reseller

| City | Service Provider Type | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|--------------------|-----------------------|----------|----------|----------|----------|-----------|
| Halifax | Incumbent | \$ 95.45 | n/a | n/a | \$ 82.90 | \$ 100.95 |
| | Reseller | \$ 45.08 | n/a | n/a | n/a | n/a |
| | <i>Difference</i> | -52.78% | n/a | n/a | n/a | n/a |
| Montreal | Incumbent | \$ 37.95 | \$ 55.95 | \$ 53.95 | \$ 68.95 | \$ 130.95 |
| | Reseller | \$ 32.12 | \$ 36.12 | \$ 45.90 | \$ 57.12 | n/a |
| | <i>Difference</i> | -15.38% | -35.45% | -14.92% | -17.16% | n/a |
| Toronto | Incumbent | \$ 32.99 | \$ 64.95 | \$ 64.99 | \$ 74.99 | \$ 94.99 |
| | Reseller | \$ 29.95 | \$ 33.12 | \$ 42.12 | \$ 52.12 | n/a |
| | <i>Difference</i> | -9.21% | -49.01% | -35.20% | -30.50% | n/a |
| Winnipeg | Incumbent | \$ 53.00 | n/a | \$ 67.00 | \$ 85.00 | n/a |
| | Reseller | n/a | n/a | n/a | n/a | n/a |
| | <i>Difference</i> | n/a | n/a | n/a | n/a | n/a |
| Regina | Incumbent | \$ 44.95 | n/a | \$ 59.95 | \$ 79.95 | n/a |
| | Reseller | n/a | n/a | n/a | n/a | n/a |
| | <i>Difference</i> | n/a | n/a | n/a | n/a | n/a |
| Vancouver | Incumbent | \$ 53.00 | \$ 63.00 | \$ 68.00 | \$ 83.00 | \$ 123.00 |
| | Reseller | \$ 29.08 | \$ 39.08 | \$ 45.90 | \$ 89.08 | n/a |
| | <i>Difference</i> | -45.14% | -37.98% | -32.50% | 7.32% | n/a |
| Unweighted Average | Incumbent | \$ 52.89 | \$ 61.30 | \$ 62.78 | \$ 79.13 | \$ 112.47 |
| | Reseller | \$ 34.05 | \$ 36.10 | \$ 44.64 | \$ 66.10 | n/a |
| | <i>Difference</i> | -35.61% | -41.11% | -28.89% | -16.47% | n/a |

Figure C. 4.1: Canadian Mobile Wireless Broadband Internet Service Level 1

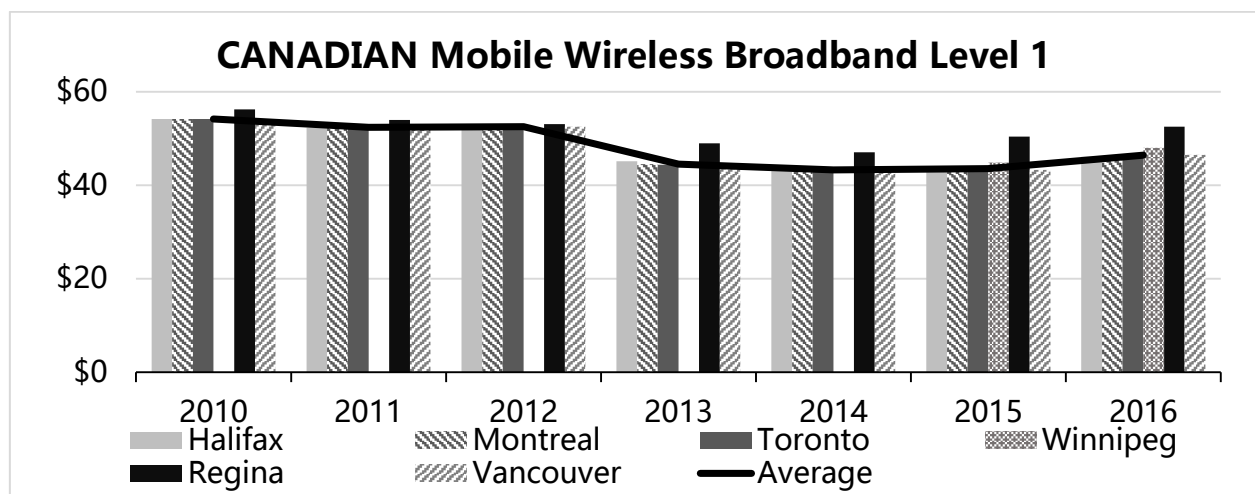


Table C. 4.1: Canadian Mobile Wireless Broadband Internet Service

Level 1: 2 GB to less than 5 GB

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|--------|
| 2010 | \$54.15 | \$54.15 | \$54.15 | n/a | \$56.23 | \$54.16 | \$54.19 | n/a |
| 2011 | \$52.32 | \$52.76 | \$52.17 | n/a | \$53.98 | \$52.22 | \$52.41 | -3.3% |
| 2012 | \$53.05 | \$52.56 | \$52.51 | n/a | \$53.05 | \$52.51 | \$52.55 | 0.3% |
| 2013 | \$45.12 | \$44.52 | \$44.37 | n/a | \$48.99 | \$44.52 | \$44.55 | -15.2% |
| 2014 | \$43.75 | \$43.22 | \$43.19 | n/a | \$47.08 | \$43.30 | \$43.30 | -2.8% |
| 2015 | \$43.06 | \$43.63 | \$43.19 | \$44.88 | \$50.38 | \$43.30 | \$43.55 | 0.6% |
| 2016 | \$46.07 | \$45.72 | \$46.53 | \$48.00 | \$52.56 | \$46.53 | \$46.47 | 6.7% |
| CAGR | -2.7% | -2.8% | -2.5% | 7.0% | -1.1% | -2.5% | -2.5% | n/a |

CAGR: Compound Annual Growth Rate from 2010 to 2016
n/a: not available
YoY: Year over Year Change

Figure C. 4.2: Canadian Mobile Wireless Broadband Internet Service Level 2

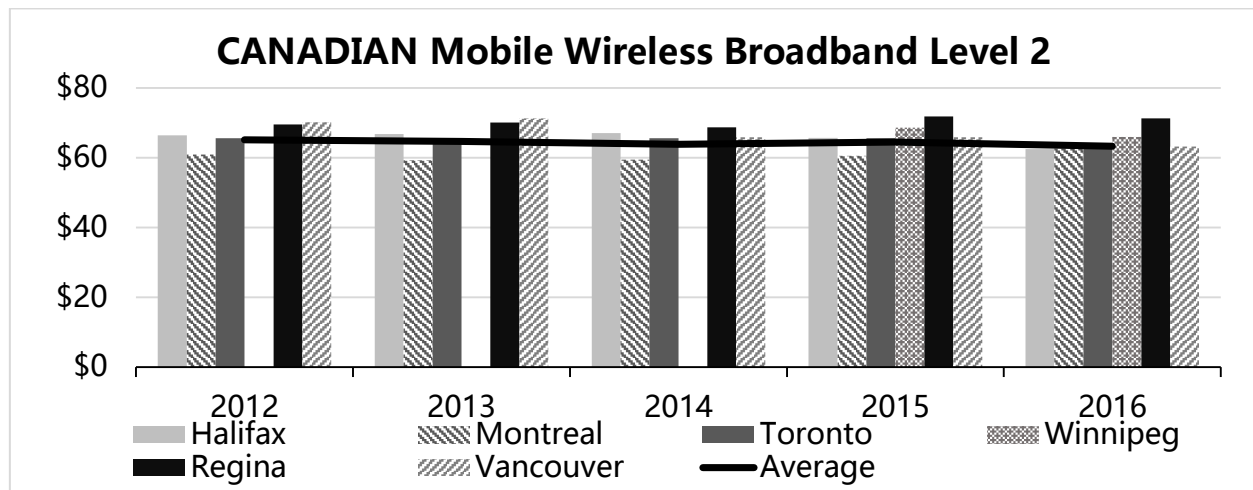


Table C. 4.2: Canadian Mobile Wireless Broadband Internet Service

Level 2: 5 GB to less than 10 GB

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2012 | \$66.38 | \$60.94 | \$65.59 | n/a | \$69.55 | \$70.22 | \$65.11 | n/a |
| 2013 | \$66.79 | \$59.22 | \$65.21 | n/a | \$70.11 | \$71.28 | \$64.67 | -0.7% |
| 2014 | \$67.08 | \$59.49 | \$65.60 | n/a | \$68.75 | \$65.90 | \$63.90 | -1.2% |
| 2015 | \$65.73 | \$60.57 | \$65.60 | \$68.63 | \$71.88 | \$65.90 | \$64.48 | 0.9% |
| 2016 | \$62.47 | \$62.62 | \$63.19 | \$66.00 | \$71.31 | \$63.19 | \$63.30 | -1.8% |
| CAGR | -1.5% | 0.7% | -0.9% | -3.8% | 0.6% | -2.6% | -0.7% | n/a |

CAGR: Compound Annual Growth Rate from 2012 to 2016
n/a: not available
YoY: Year over Year Change

Figure C. 4.3: Canadian Mobile Wireless Broadband Internet Service

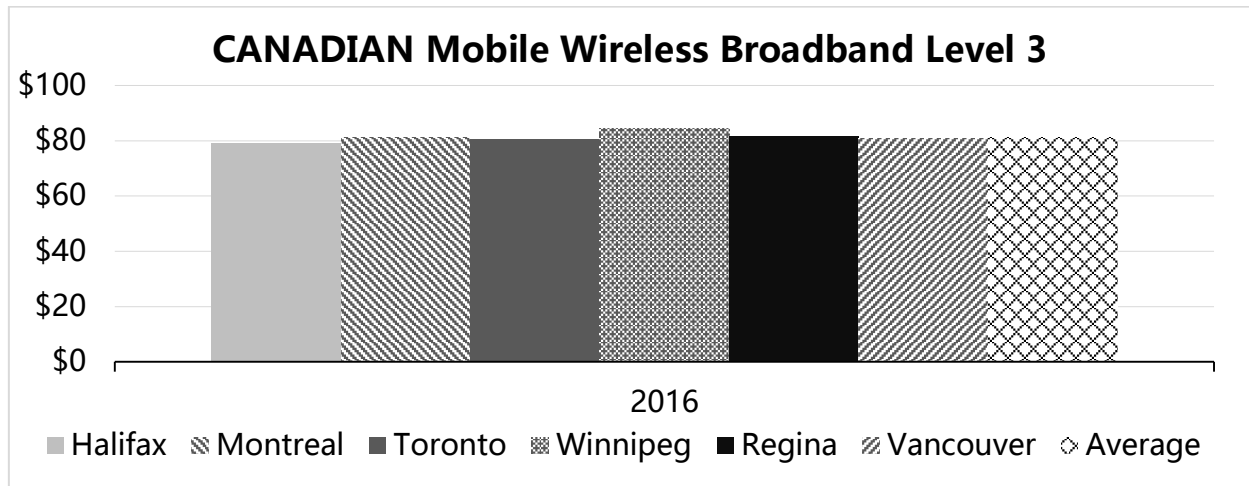


Table C. 4.3: Canadian Mobile Wireless Broadband Internet Service

Level 3: 10 GB and more

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|---------|----------|---------|----------|---------|-----------|---------|-------|
| 2016 | \$78.89 | \$81.07 | \$80.70 | \$84.50 | \$81.41 | \$80.70 | \$80.98 | n/a |

n/a: not available
YoY: Year over Year Change

Figure C. 5.1: Canadian Bundled Services

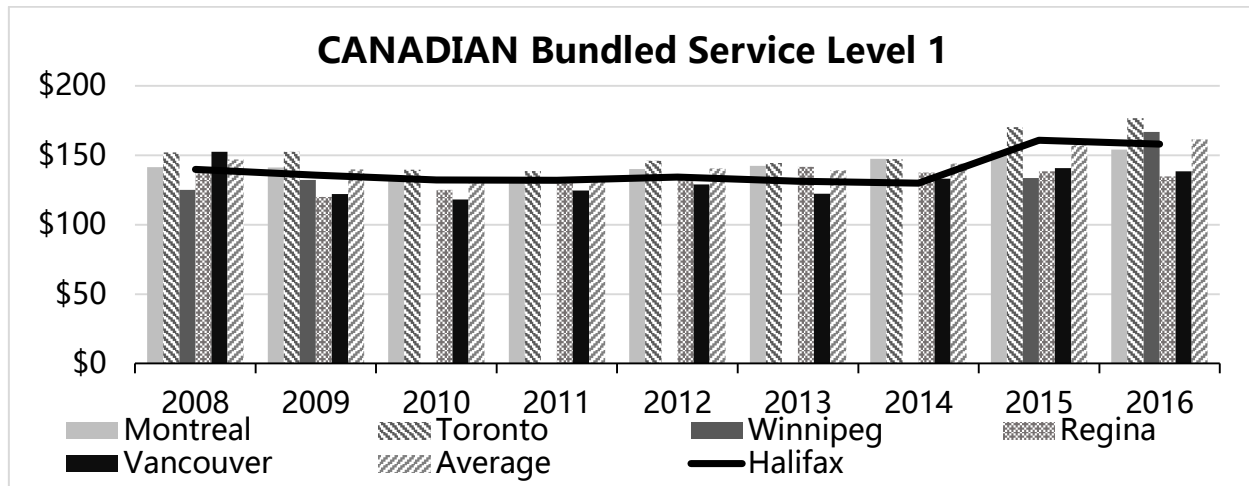


Table C. 5.1: Canadian Bundled Services

Level 1: Wireline, Wireless & Fixed Broadband

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|----------|-------|
| 2008 | \$139.86 | \$141.61 | \$152.20 | \$125.07 | \$140.02 | \$152.47 | \$146.96 | n/a |
| 2009 | \$135.63 | \$141.37 | \$152.65 | \$132.22 | \$120.12 | \$122.22 | \$139.86 | -4.8% |
| 2010 | \$132.23 | \$135.16 | \$139.75 | n/a | \$125.12 | \$118.30 | \$133.83 | -4.3% |
| 2011 | \$132.10 | \$131.72 | \$138.69 | n/a | \$130.36 | \$124.54 | \$133.50 | -0.2% |
| 2012 | \$134.44 | \$140.06 | \$146.09 | n/a | \$133.85 | \$129.11 | \$140.47 | 5.2% |
| 2013 | \$131.27 | \$142.46 | \$144.41 | n/a | \$141.80 | \$122.25 | \$139.15 | -0.9% |
| 2014 | \$130.02 | \$147.46 | \$147.28 | n/a | \$137.55 | \$133.21 | \$143.95 | 3.4% |
| 2015 | \$160.86 | \$152.89 | \$170.33 | \$133.71 | \$138.55 | \$140.76 | \$157.20 | 9.2% |
| 2016 | \$158.19 | \$154.14 | \$176.67 | \$166.80 | \$134.72 | \$138.46 | \$161.63 | 2.8% |
| CAGR | 1.6% | 1.1% | 1.9% | 3.7% | -0.5% | -1.2% | 1.2% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C. 5.2: Canadian Bundled Services

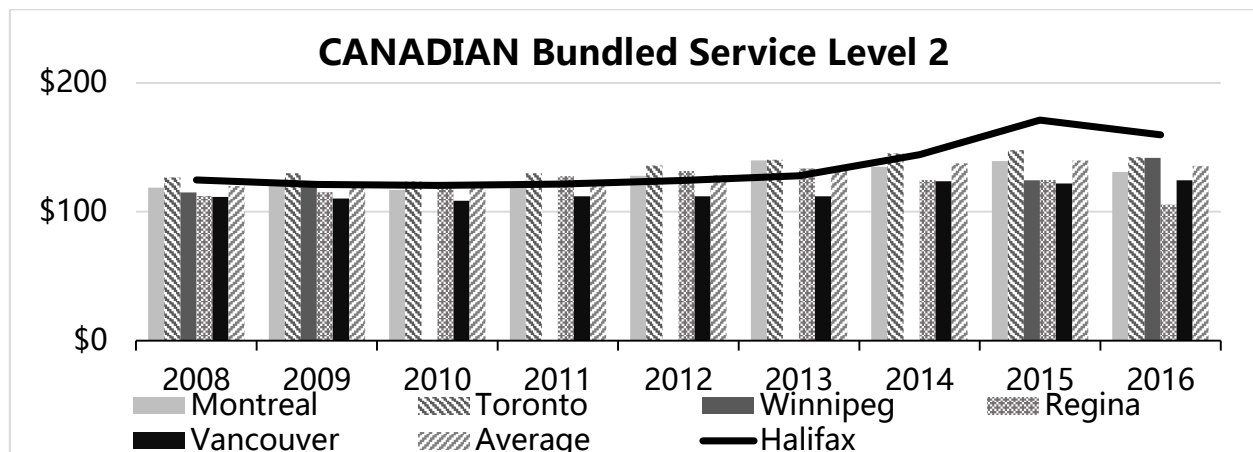


Table C. 5.2: Canadian Bundled Services

Level 2: Wireline, Fixed Broadband & TV

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|----------|-------|
| 2008 | \$124.71 | \$118.68 | \$126.54 | \$114.83 | \$112.13 | \$111.40 | \$119.93 | n/a |
| 2009 | \$121.14 | \$123.46 | \$129.71 | \$121.76 | \$115.13 | \$110.31 | \$122.43 | 2.1% |
| 2010 | \$120.37 | \$116.94 | \$123.39 | n/a | \$119.47 | \$108.36 | \$118.41 | -3.3% |
| 2011 | \$121.46 | \$119.09 | \$129.92 | n/a | \$127.52 | \$112.05 | \$122.87 | 3.8% |
| 2012 | \$124.19 | \$127.91 | \$135.81 | n/a | \$131.56 | \$111.81 | \$128.44 | 4.5% |
| 2013 | \$127.95 | \$139.67 | \$140.25 | n/a | \$133.57 | \$111.87 | \$134.19 | 4.5% |
| 2014 | \$144.34 | \$134.74 | \$145.16 | n/a | \$124.63 | \$123.57 | \$137.51 | 2.5% |
| 2015 | \$171.00 | \$139.37 | \$147.79 | \$124.39 | \$124.66 | \$121.95 | \$139.78 | 1.6% |
| 2016 | \$159.60 | \$130.85 | \$142.16 | \$141.65 | \$105.39 | \$124.25 | \$135.60 | -3.0% |
| CAGR | 3.1% | 1.2% | 1.5% | 2.7% | -0.8% | 1.4% | 1.5% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available
YoY: Year over Year Change

Figure C. 5.3: Canadian Bundled Services

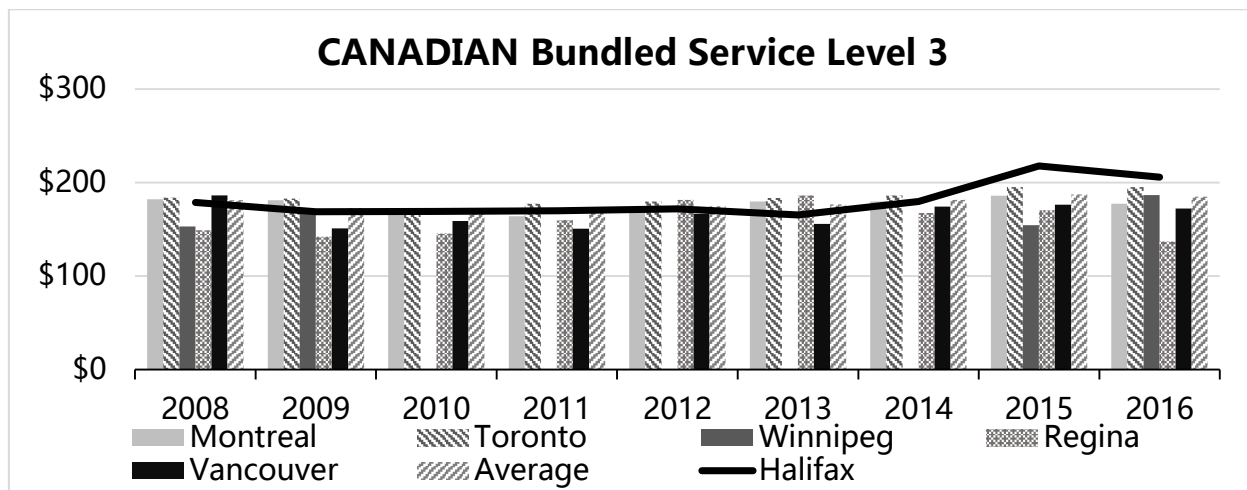


Table C. 5.3: Canadian Bundled Services

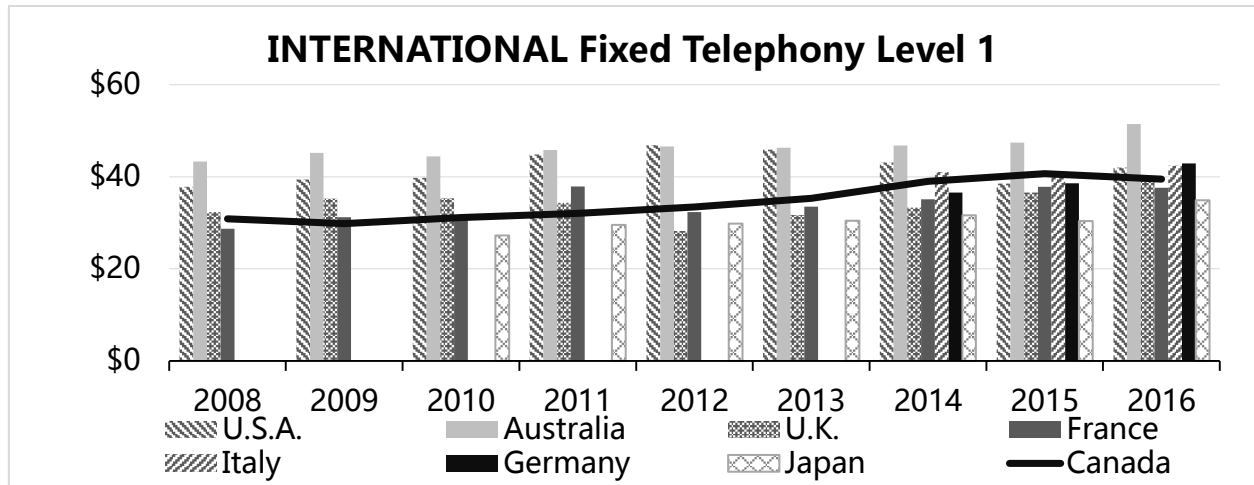
Level 3: Wireline, Wireless, Fixed Broadband & TV

| Year | Halifax | Montreal | Toronto | Winnipeg | Regina | Vancouver | Average | YoY % |
|------|----------|----------|----------|----------|----------|-----------|----------|-------|
| 2008 | \$178.86 | \$182.13 | \$183.94 | \$153.06 | \$148.97 | \$186.47 | \$181.31 | n/a |
| 2009 | \$169.03 | \$181.24 | \$182.81 | \$168.21 | \$142.07 | \$151.22 | \$172.68 | -4.8% |
| 2010 | \$169.19 | \$168.65 | \$169.82 | n/a | \$145.81 | \$158.98 | \$167.01 | -3.3% |
| 2011 | \$170.01 | \$164.24 | \$177.48 | n/a | \$160.04 | \$150.77 | \$167.81 | 0.5% |
| 2012 | \$171.85 | \$171.99 | \$179.85 | n/a | \$181.58 | \$166.61 | \$174.71 | 4.1% |
| 2013 | \$165.50 | \$179.99 | \$183.73 | n/a | \$186.56 | \$155.97 | \$176.80 | 1.2% |
| 2014 | \$180.02 | \$179.87 | \$186.56 | n/a | \$167.45 | \$174.55 | \$181.70 | 2.8% |
| 2015 | \$217.93 | \$186.00 | \$195.47 | \$154.39 | \$170.48 | \$176.51 | \$187.33 | 3.1% |
| 2016 | \$206.09 | \$177.55 | \$195.41 | \$186.80 | \$137.22 | \$172.50 | \$185.06 | -1.2% |
| CAGR | 1.8% | -0.3% | 0.8% | 2.5% | -1.0% | -1.0% | 0.3% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016

n/a: not available

YoY: Year over Year Change

APPENDIX D: INTERNATIONAL PRICE COMPARISONS
Figure D. 1.1: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)

Table D. 1.1: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)

Level 1: 400 Minutes with 10% LD

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$30.88 | \$37.82 | \$43.35 | \$32.32 | \$28.73 | n/a | n/a | n/a |
| 2009 | \$29.80 | \$39.45 | \$45.20 | \$35.24 | \$31.24 | n/a | n/a | n/a |
| 2010 | \$31.16 | \$39.75 | \$44.45 | \$35.32 | \$31.53 | n/a | n/a | \$27.23 |
| 2011 | \$32.06 | \$44.84 | \$45.86 | \$34.35 | \$37.86 | n/a | n/a | \$29.55 |
| 2012 | \$33.42 | \$46.84 | \$46.57 | \$28.22 | \$32.34 | n/a | n/a | \$29.84 |
| 2013 | \$35.33 | \$45.88 | \$46.30 | \$31.68 | \$33.53 | n/a | n/a | \$30.45 |
| 2014 | \$38.99 | \$43.13 | \$46.80 | \$33.28 | \$35.10 | \$41.04 | \$36.55 | \$31.61 |
| 2015 | \$40.64 | \$38.49 | \$47.41 | \$36.60 | \$37.85 | \$40.09 | \$38.57 | \$30.41 |
| 2016 | \$39.52 | \$42.03 | \$51.43 | \$39.61 | \$37.61 | \$42.40 | \$42.93 | \$34.91 |
| CAGR | 3.1% | 1.3% | 2.2% | 2.6% | 3.4% | 1.6% | 8.4% | 4.2% |

CAGR: Compound Annual Growth Rate from 2008 to 2016

n/a: not available

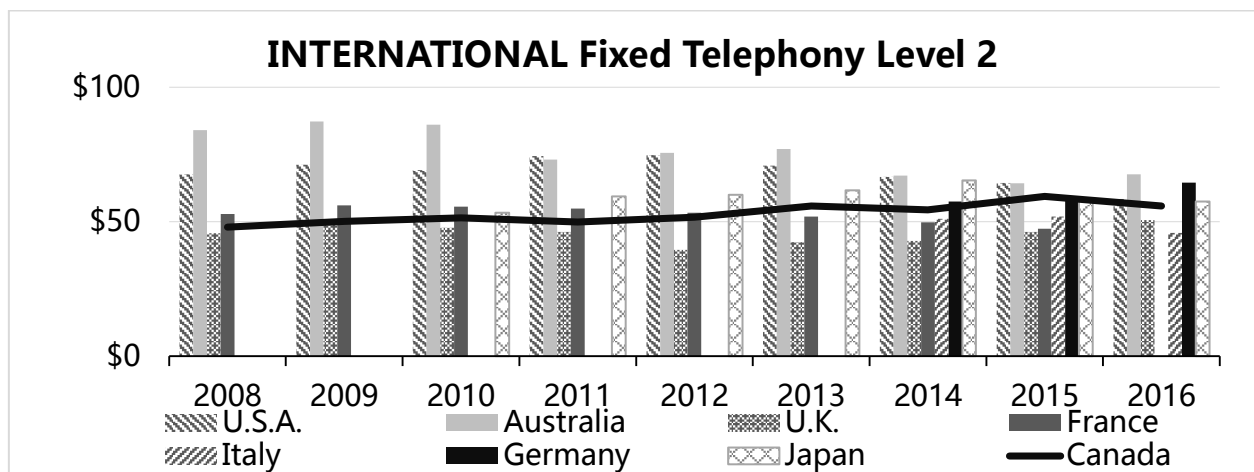
Figure D. 1.2: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)


Table D. 1.2: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)

Level 2: 1,000 Minutes with 20% LD

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$47.91 | \$67.63 | \$84.09 | \$45.71 | \$52.84 | n/a | n/a | n/a |
| 2009 | \$50.05 | \$71.15 | \$87.22 | \$49.68 | \$56.10 | n/a | n/a | n/a |
| 2010 | \$51.42 | \$69.13 | \$86.10 | \$47.74 | \$55.63 | n/a | n/a | \$53.30 |
| 2011 | \$49.81 | \$74.37 | \$73.02 | \$46.18 | \$54.83 | n/a | n/a | \$59.33 |
| 2012 | \$51.71 | \$74.75 | \$75.55 | \$39.57 | \$53.29 | n/a | n/a | \$60.00 |
| 2013 | \$55.77 | \$70.85 | \$77.05 | \$42.35 | \$51.93 | n/a | n/a | \$61.70 |
| 2014 | \$54.37 | \$66.61 | \$67.13 | \$42.81 | \$49.72 | \$51.02 | \$57.46 | \$65.36 |
| 2015 | \$59.44 | \$64.45 | \$64.31 | \$46.17 | \$47.37 | \$51.90 | \$59.24 | \$58.18 |
| 2016 | \$55.78 | \$58.46 | \$67.59 | \$50.59 | n/a | \$45.81 | \$64.49 | \$57.46 |
| CAGR | 1.9% | -1.8% | -2.7% | 1.3% | -1.5% | -5.2% | 5.9% | 1.3% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 1.3: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)

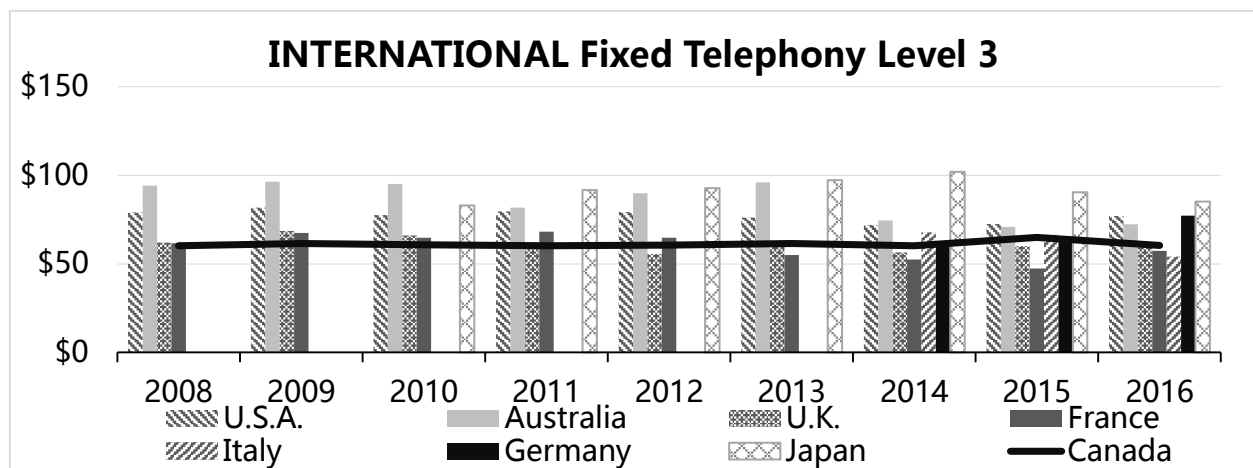


Table D. 1.3: International Fixed Telephony Service Basket Prices (PPP-Adjusted CA\$)

Level 3: 1,600 Minutes with 30% LD

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|----------|
| 2008 | \$60.27 | \$79.05 | \$94.21 | \$61.99 | \$61.74 | n/a | n/a | n/a |
| 2009 | \$61.55 | \$81.66 | \$96.32 | \$68.51 | \$67.35 | n/a | n/a | n/a |
| 2010 | \$60.78 | \$77.58 | \$94.98 | \$66.03 | \$64.65 | n/a | n/a | \$82.95 |
| 2011 | \$60.22 | \$79.59 | \$81.77 | \$60.86 | \$68.20 | n/a | n/a | \$91.61 |
| 2012 | \$60.52 | \$79.21 | \$89.81 | \$55.60 | \$64.76 | n/a | n/a | \$92.65 |
| 2013 | \$61.53 | \$76.08 | \$96.00 | \$61.35 | \$55.03 | n/a | n/a | \$97.17 |
| 2014 | \$60.29 | \$71.88 | \$74.54 | \$56.48 | \$52.39 | \$67.85 | \$60.89 | \$101.90 |
| 2015 | \$64.96 | \$72.48 | \$70.94 | \$59.97 | \$47.37 | \$66.32 | \$62.93 | \$90.31 |
| 2016 | \$60.32 | \$77.05 | \$72.23 | \$59.28 | \$57.41 | \$54.01 | \$77.11 | \$85.17 |
| CAGR | 0.0% | -0.3% | -3.3% | -0.6% | -0.9% | -10.8% | 12.5% | 0.4% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.1: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

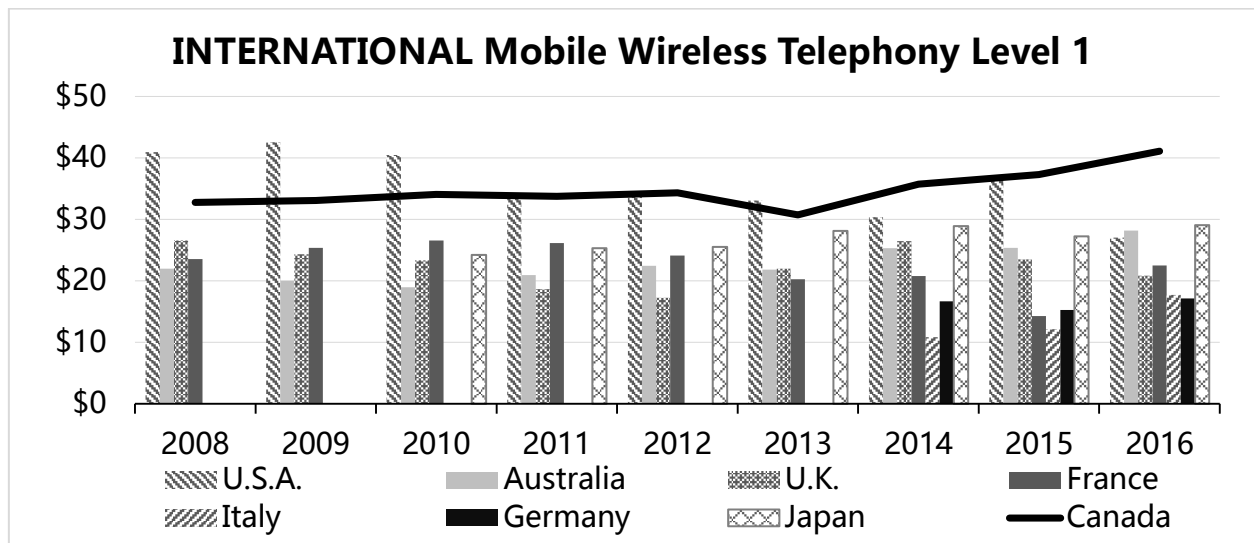


Table D. 2.1: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 1: 150 Minutes

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$32.73 | \$40.92 | \$21.96 | \$26.57 | \$23.55 | n/a | n/a | n/a |
| 2009 | \$33.03 | \$42.51 | \$19.98 | \$24.33 | \$25.37 | n/a | n/a | n/a |
| 2010 | \$34.03 | \$40.43 | \$18.96 | \$23.31 | \$26.54 | n/a | n/a | \$24.20 |
| 2011 | \$33.73 | \$33.38 | \$20.95 | \$18.64 | \$26.13 | n/a | n/a | \$25.29 |
| 2012 | \$34.32 | \$33.78 | \$22.44 | \$17.21 | \$24.09 | n/a | n/a | \$25.53 |
| 2013 | \$30.71 | \$33.08 | \$21.82 | \$21.97 | \$20.24 | n/a | n/a | \$28.09 |
| 2014 | \$35.70 | \$30.34 | \$25.28 | \$26.46 | \$20.75 | \$10.85 | \$16.68 | \$28.88 |
| 2015 | \$37.29 | \$37.04 | \$25.35 | \$23.50 | \$14.26 | \$12.15 | \$15.23 | \$27.23 |
| 2016 | \$41.08 | \$27.00 | \$28.19 | \$20.84 | \$22.49 | \$17.70 | \$17.15 | \$29.06 |
| CAGR | 2.9% | -5.1% | 3.2% | -3.0% | -0.6% | 12.0% | 1.4% | 3.1% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.2: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

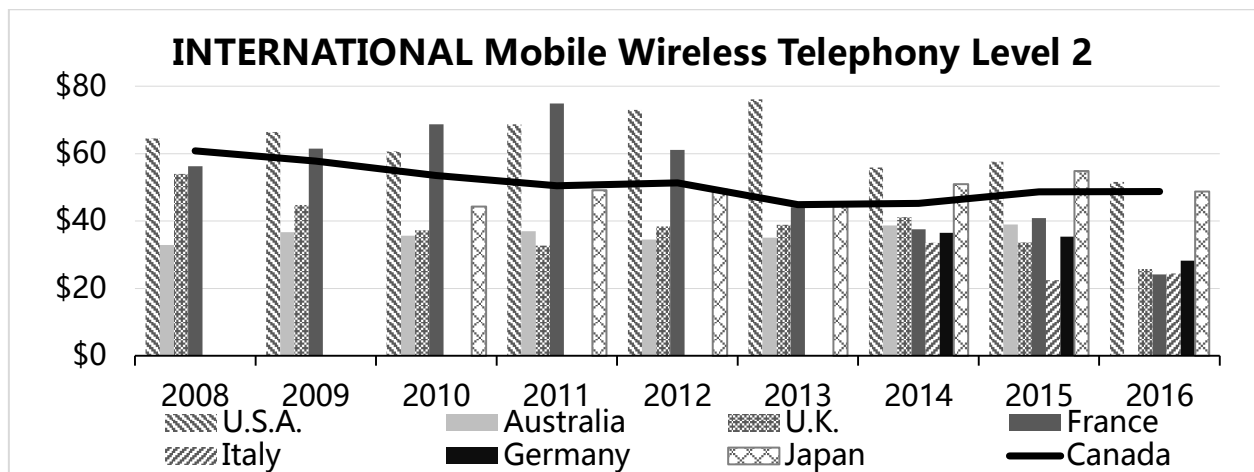


Table D. 2.2: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 2: 450 Minutes and 300 TMS

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$60.81 | \$64.54 | \$32.90 | \$53.98 | \$56.30 | n/a | n/a | n/a |
| 2009 | \$57.78 | \$66.38 | \$36.67 | \$44.73 | \$61.51 | n/a | n/a | n/a |
| 2010 | \$53.49 | \$60.60 | \$35.65 | \$37.27 | \$68.70 | n/a | n/a | \$44.34 |
| 2011 | \$50.51 | \$68.69 | \$36.97 | \$32.75 | \$74.86 | n/a | n/a | \$49.14 |
| 2012 | \$51.31 | \$72.94 | \$34.56 | \$38.43 | \$61.13 | n/a | n/a | \$49.28 |
| 2013 | \$44.86 | \$76.14 | \$35.04 | \$38.85 | \$44.08 | n/a | n/a | \$44.36 |
| 2014 | \$45.26 | \$55.91 | \$38.69 | \$41.17 | \$37.55 | \$33.61 | \$36.48 | \$50.98 |
| 2015 | \$48.68 | \$57.59 | \$38.98 | \$33.62 | \$40.87 | \$22.48 | \$35.35 | \$54.81 |
| 2016 | \$48.77 | \$51.64 | n/a | \$25.79 | \$24.17 | \$24.41 | \$28.28 | \$48.78 |
| CAGR | -2.7% | -2.7% | 2.4% | -8.8% | -10.0% | -14.8% | -11.9% | 1.6% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.3: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

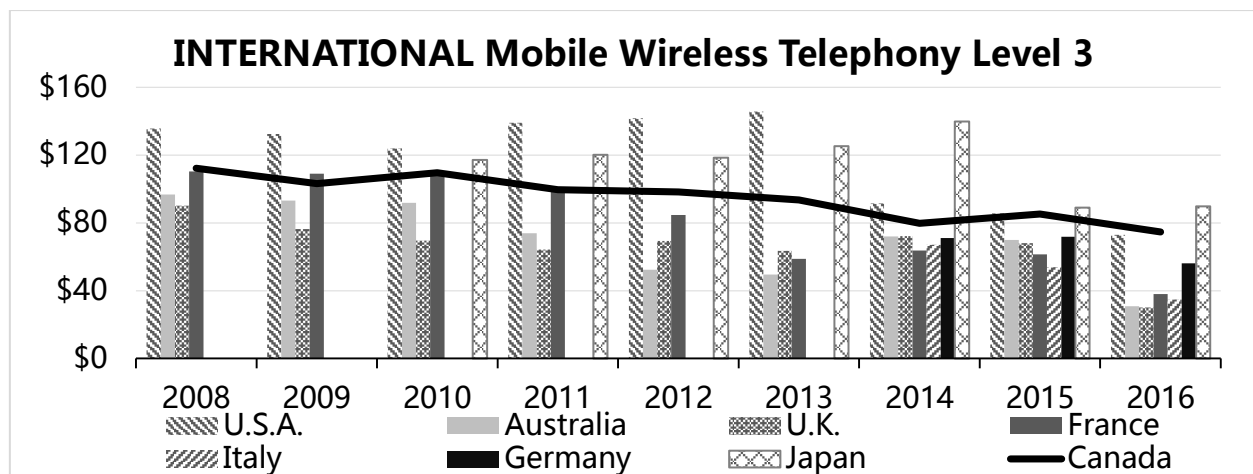


Table D. 2.3: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 3: 1,200 Minutes, 300 TMS and 1 GB Data

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|---------|----------|---------|---------|----------|
| 2008 | \$112.34 | \$135.72 | \$96.75 | \$90.23 | \$110.46 | n/a | n/a | n/a |
| 2009 | \$103.24 | \$132.58 | \$93.13 | \$76.36 | \$109.08 | n/a | n/a | n/a |
| 2010 | \$109.59 | \$124.01 | \$91.93 | \$69.49 | \$109.37 | n/a | n/a | \$117.19 |
| 2011 | \$99.69 | \$139.03 | \$73.87 | \$64.27 | \$100.75 | n/a | n/a | \$120.21 |
| 2012 | \$98.37 | \$141.80 | \$52.35 | \$69.30 | \$84.77 | n/a | n/a | \$118.51 |
| 2013 | \$93.59 | \$145.79 | \$49.54 | \$63.52 | \$58.90 | n/a | n/a | \$125.24 |
| 2014 | \$79.69 | \$91.52 | \$72.10 | \$72.14 | \$63.68 | \$67.06 | \$71.15 | \$139.90 |
| 2015 | \$85.22 | \$85.65 | \$69.97 | \$68.03 | \$61.50 | \$53.94 | \$71.91 | \$88.96 |
| 2016 | \$74.67 | \$73.00 | \$30.91 | \$30.13 | \$38.08 | \$34.79 | \$56.20 | \$89.72 |
| CAGR | -5.0% | -7.5% | -13.3% | -12.8% | -12.5% | -28.0% | -11.1% | -4.4% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.4: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

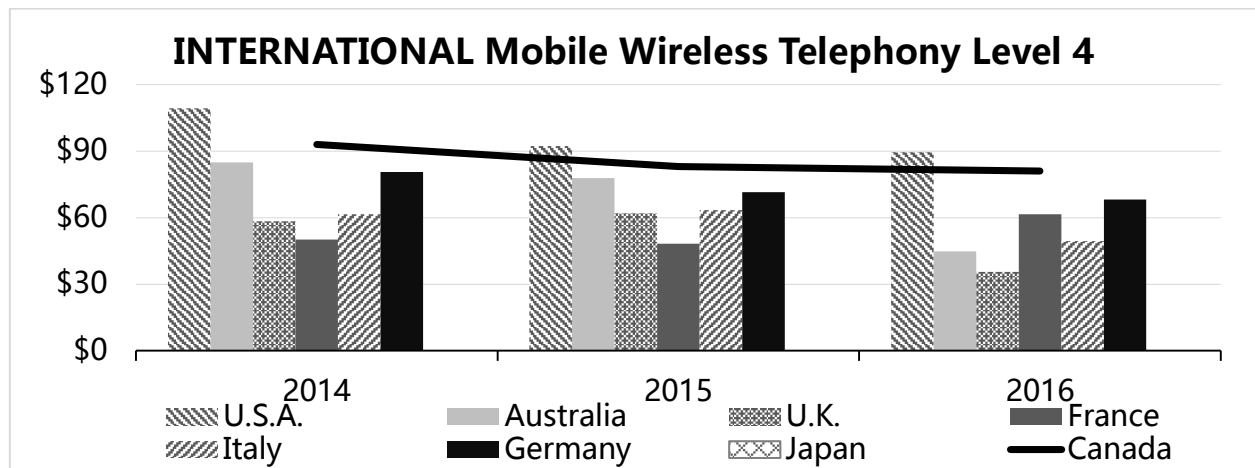


Table D. 2.4: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 4: Unlimited Minutes, TMS and 2 GB Data

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|----------|-----------|---------|---------|---------|---------|-------|
| 2014 | \$92.99 | \$109.28 | \$84.85 | \$58.37 | \$50.14 | \$61.52 | \$80.63 | n/a |
| 2015 | \$83.08 | \$92.23 | \$77.80 | \$62.03 | \$48.24 | \$63.47 | \$71.56 | n/a |
| 2016 | \$81.05 | \$89.50 | \$44.78 | \$35.55 | \$61.60 | \$49.42 | \$68.12 | n/a |
| CAGR | -6.6% | -9.5% | -27.4% | -22.0% | 10.8% | -10.4% | -8.1% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.5: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

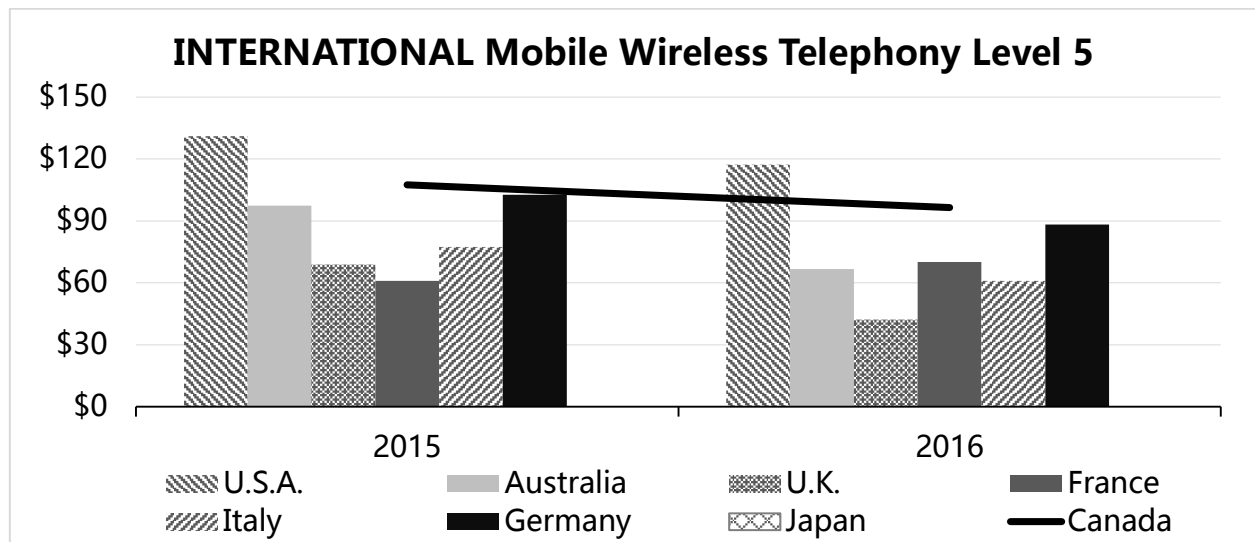


Table D. 2.5: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 5: Unlimited Minutes, TMS and 5 GB Data

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|---------|---------|---------|----------|-------|
| 2015 | \$107.50 | \$131.12 | \$97.43 | \$68.93 | \$60.96 | \$77.44 | \$102.74 | n/a |
| 2016 | \$96.55 | \$117.33 | \$66.67 | \$42.22 | \$70.12 | \$61.02 | \$88.23 | n/a |
| CAGR | -10.2% | -10.5% | -31.6% | -38.8% | 15.0% | -21.2% | -14.1% | n/a |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 2.6: International Wireless Telephony Service Prices (PPP-Adjusted CA\$)

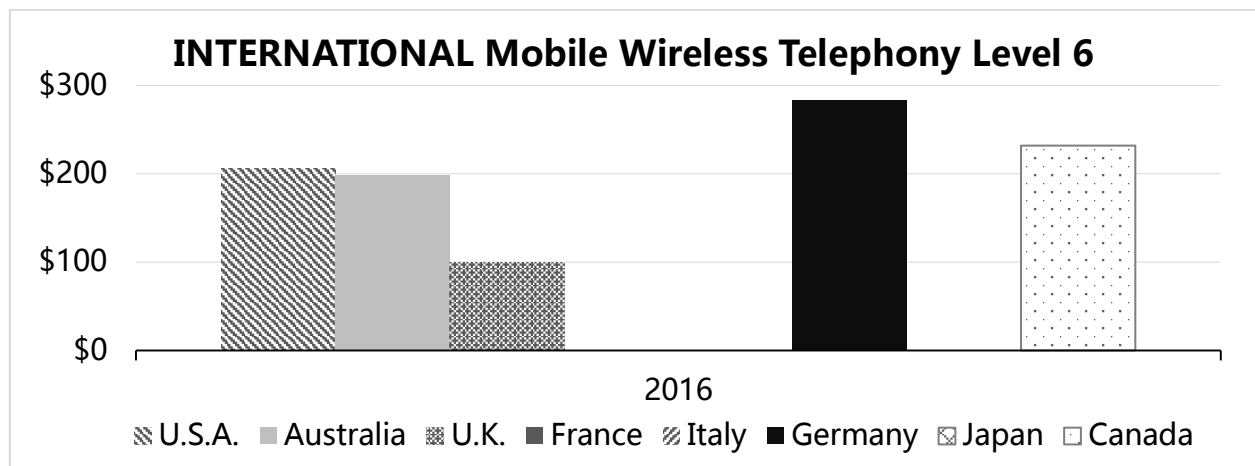


Table D. 2.6: International Wireless Telephony and Text Messaging Service (PPP-Adjusted CA\$)

Level 6: Unlimited Minutes, TMS and 10 GB Data with 3 Lines

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|---------|--------|-------|----------|-------|
| 2016 | \$231.99 | \$206.19 | \$198.50 | \$99.31 | n/a | n/a | \$284.12 | n/a |

n/a: not available

Figure D. 3.1: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

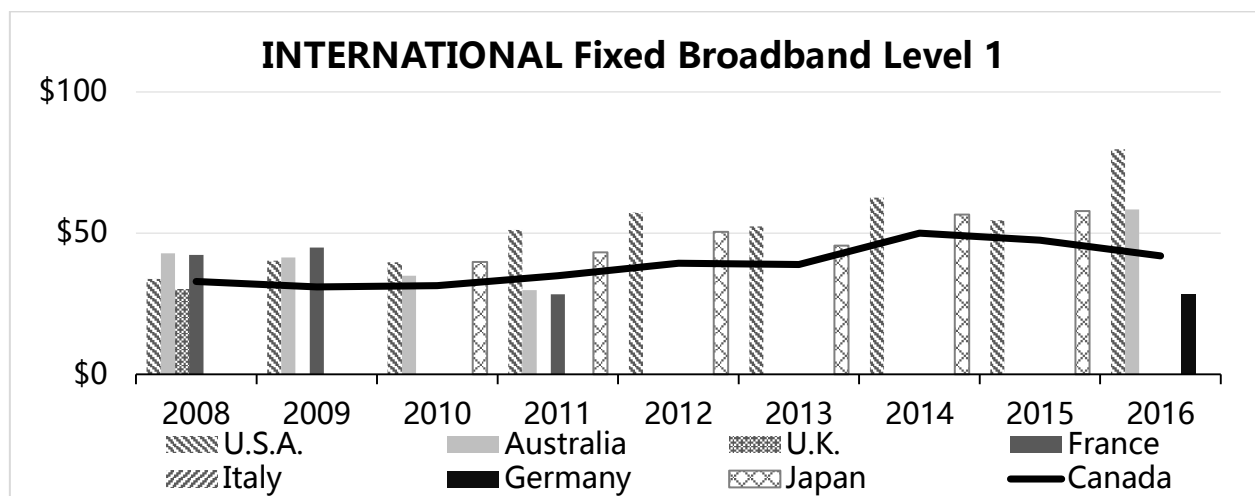


Table D. 3.1: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

Level 1: 3 to 9 Mbps

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|-------|---------|---------|
| 2008 | \$32.88 | \$33.77 | \$42.79 | \$29.93 | \$42.23 | n/a | n/a | n/a |
| 2009 | \$30.98 | \$40.19 | \$41.31 | n/a | \$44.87 | n/a | n/a | n/a |
| 2010 | \$31.44 | \$39.61 | \$34.91 | n/a | n/a | n/a | n/a | \$39.73 |
| 2011 | \$34.85 | \$51.06 | \$29.84 | n/a | \$28.33 | n/a | n/a | \$43.13 |
| 2012 | \$39.37 | \$57.24 | n/a | n/a | n/a | n/a | n/a | \$50.48 |
| 2013 | \$38.91 | \$52.38 | n/a | n/a | n/a | n/a | n/a | \$45.55 |
| 2014 | \$50.00 | \$62.53 | n/a | n/a | n/a | n/a | n/a | \$56.55 |
| 2015 | \$47.51 | \$54.54 | n/a | n/a | n/a | n/a | n/a | \$57.83 |
| 2016 | \$41.94 | \$79.64 | \$58.38 | n/a | n/a | n/a | \$28.28 | n/a |
| CAGR | 3.1% | 11.3% | 4.0% | n/a | -12.5% | n/a | n/a | 7.8% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 3.2: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

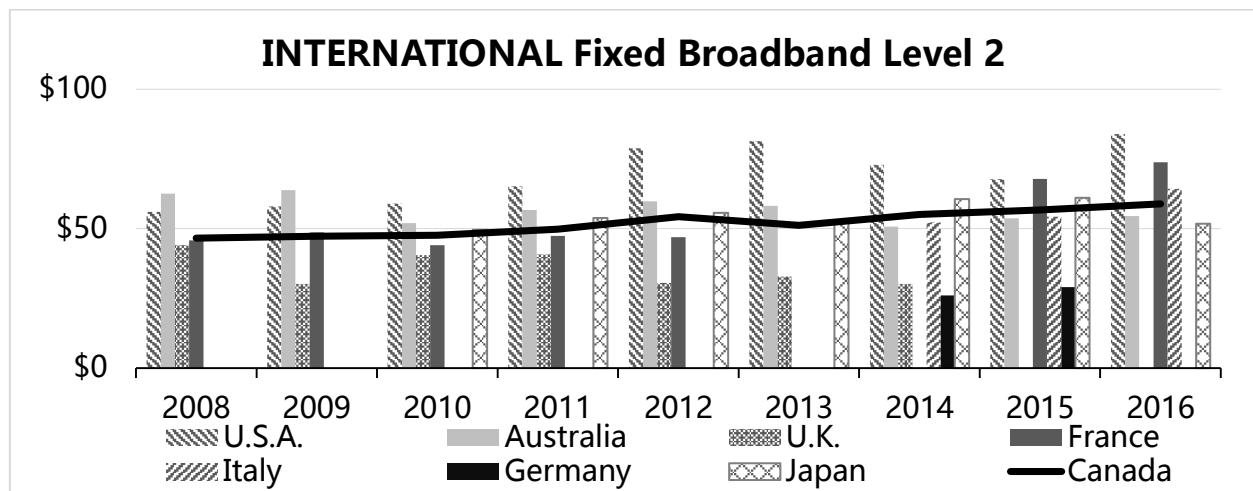


Table D. 3.2: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

Level 2: 10 to 15 Mbps

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$46.58 | \$55.97 | \$62.56 | \$44.05 | \$45.82 | n/a | n/a | n/a |
| 2009 | \$47.26 | \$57.92 | \$63.76 | \$30.22 | \$48.69 | n/a | n/a | n/a |
| 2010 | \$47.60 | \$58.97 | \$52.01 | \$40.57 | \$44.03 | n/a | n/a | \$49.55 |
| 2011 | \$49.79 | \$65.14 | \$56.74 | \$40.72 | \$47.41 | n/a | n/a | \$53.79 |
| 2012 | \$54.31 | \$78.84 | \$59.81 | \$30.50 | \$46.97 | n/a | n/a | \$55.70 |
| 2013 | \$51.20 | \$81.42 | \$58.15 | \$32.85 | n/a | n/a | n/a | \$52.53 |
| 2014 | \$55.10 | \$72.91 | \$50.67 | \$30.22 | n/a | \$52.26 | \$26.09 | \$60.65 |
| 2015 | \$56.66 | \$67.66 | \$53.75 | n/a | \$67.78 | \$54.31 | \$29.08 | \$61.03 |
| 2016 | \$58.88 | \$83.85 | \$54.49 | n/a | \$73.83 | \$64.29 | n/a | \$51.75 |
| CAGR | 3.0% | 5.2% | -1.7% | -6.1% | 6.1% | 10.9% | 11.4% | 0.7% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 3.3: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

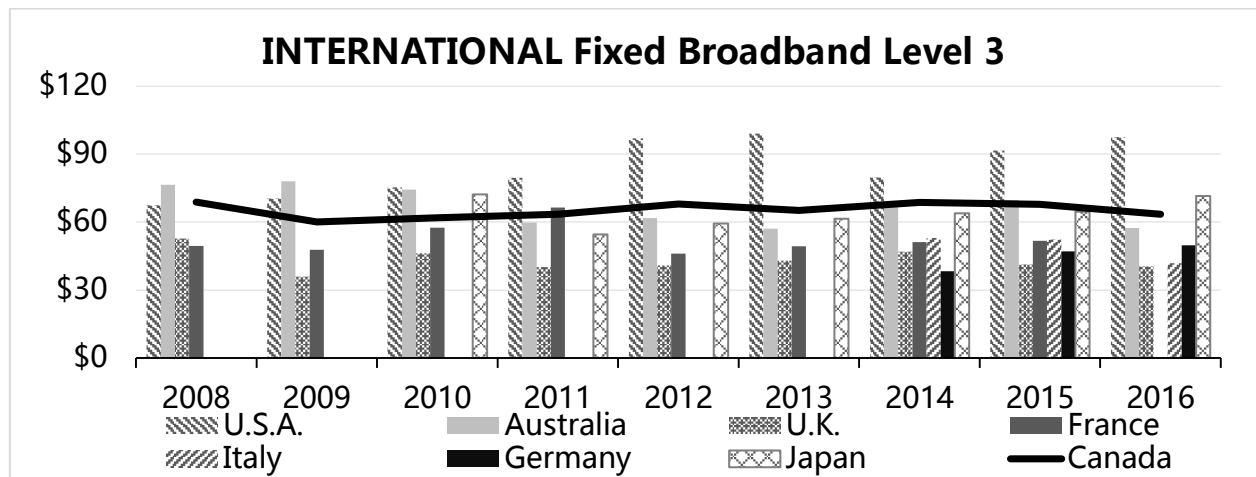


Table D. 3.3: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

Level 3: 16 to 40 Mbps

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2008 | \$68.74 | \$67.40 | \$76.47 | \$52.72 | \$49.41 | n/a | n/a | n/a |
| 2009 | \$60.08 | \$70.41 | \$77.98 | \$35.93 | \$47.73 | n/a | n/a | n/a |
| 2010 | \$61.88 | \$75.26 | \$74.32 | \$46.24 | \$57.45 | n/a | n/a | \$72.15 |
| 2011 | \$63.44 | \$79.60 | \$59.72 | \$40.09 | \$66.37 | n/a | n/a | \$54.52 |
| 2012 | \$67.94 | \$97.00 | \$61.69 | \$40.88 | \$46.07 | n/a | n/a | \$59.37 |
| 2013 | \$65.18 | \$99.10 | \$57.10 | \$43.01 | \$49.34 | n/a | n/a | \$61.52 |
| 2014 | \$68.60 | \$79.76 | \$67.44 | \$46.89 | \$51.15 | \$52.92 | \$38.30 | \$63.88 |
| 2015 | \$67.81 | \$91.55 | \$69.64 | \$41.25 | \$51.68 | \$52.28 | \$47.08 | \$64.50 |
| 2016 | \$63.48 | \$97.53 | \$57.41 | \$40.43 | n/a | \$41.77 | \$49.75 | \$71.52 |
| CAGR | -1.0% | 4.7% | -3.5% | -3.3% | 0.6% | -11.2% | 14.0% | -0.1% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 3.4: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

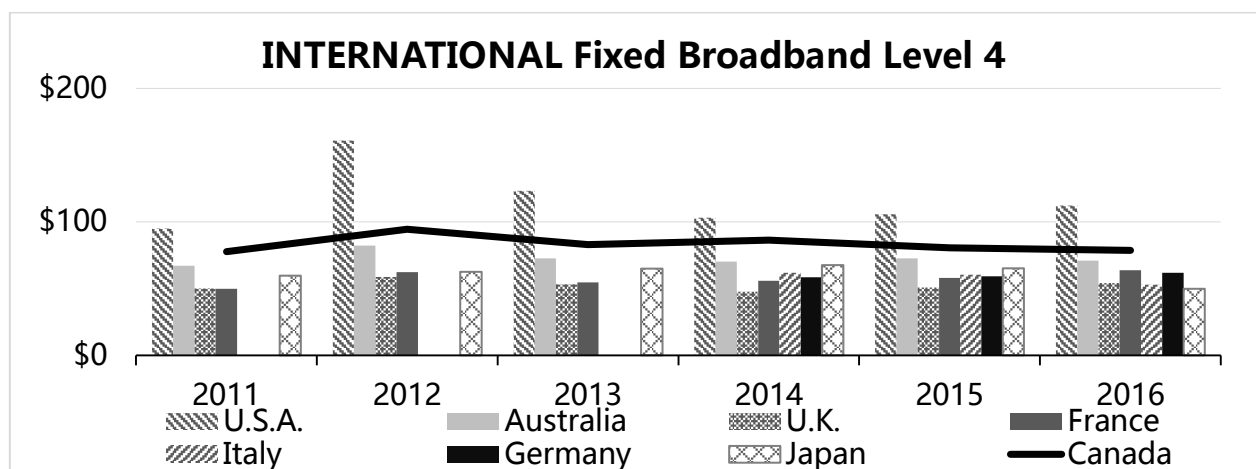


Table D. 3.4: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

Level 4: 41 to 100 Mbps

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|----------|-----------|---------|---------|---------|---------|---------|
| 2011 | \$77.71 | \$95.07 | \$67.19 | \$50.07 | \$49.79 | n/a | n/a | \$59.76 |
| 2012 | \$94.39 | \$160.97 | \$82.25 | \$58.66 | \$62.36 | n/a | n/a | \$62.65 |
| 2013 | \$82.88 | \$123.27 | \$72.69 | \$53.31 | \$54.58 | n/a | n/a | \$64.89 |
| 2014 | \$86.46 | \$103.17 | \$70.33 | \$47.76 | \$55.98 | \$61.79 | \$58.52 | \$67.73 |
| 2015 | \$80.63 | \$105.90 | \$72.66 | \$50.75 | \$57.95 | \$60.45 | \$59.32 | \$65.32 |
| 2016 | \$78.77 | \$112.30 | \$71.03 | \$54.20 | \$63.80 | \$53.02 | \$61.78 | \$49.78 |
| CAGR | 0.3% | 3.4% | 1.1% | 1.6% | 5.1% | -7.4% | 2.7% | -3.6% |

CAGR: Compound Annual Growth Rate from 2011 to 2016
n/a: not available

Figure D. 3.5: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

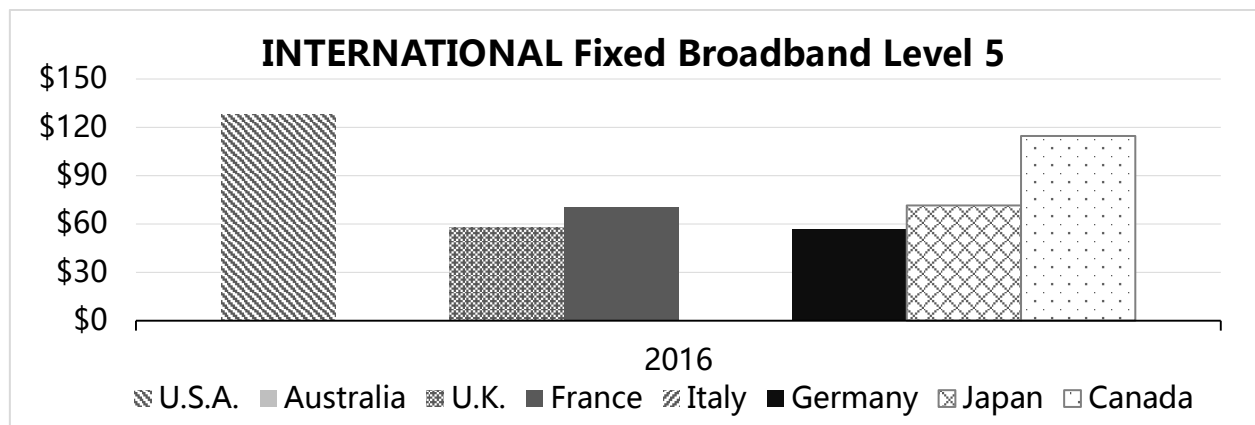


Table D. 3.5: International Fixed Broadband Internet Service Prices (PPP-Adjusted CA\$)

Level 5: Over 100 Mbps

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|---------|---------|-------|---------|---------|
| 2016 | \$114.65 | \$127.69 | n/a | \$57.56 | \$70.54 | n/a | \$56.57 | \$71.36 |

n/a: not available

Figure D. 4.1: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

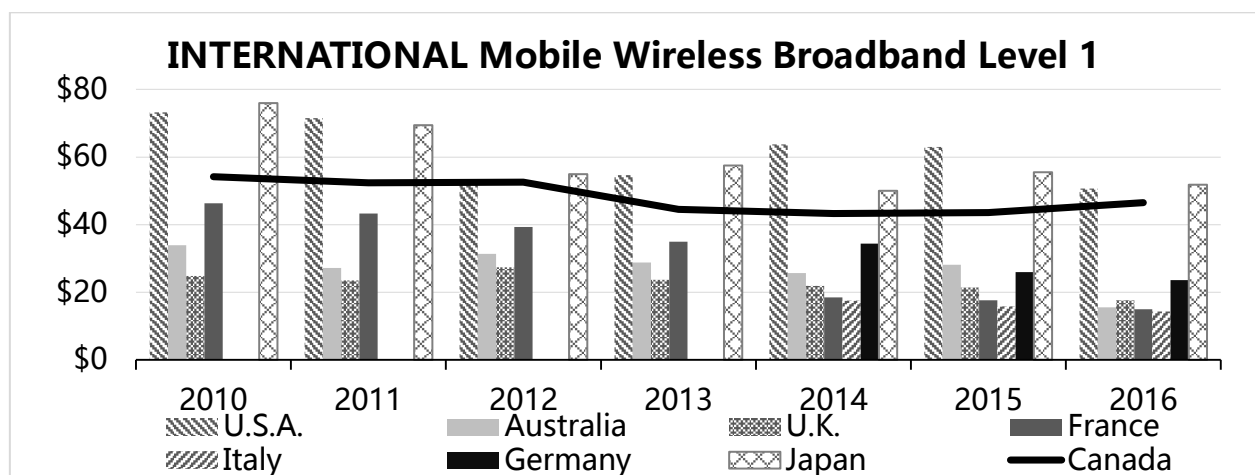


Table D. 4.1: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

Level 1: 2 GB to less than 5 GB

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|---------|---------|---------|---------|
| 2010 | \$54.19 | \$73.26 | \$33.89 | \$24.86 | \$46.29 | n/a | n/a | \$76.00 |
| 2011 | \$52.41 | \$71.50 | \$27.18 | \$23.51 | \$43.30 | n/a | n/a | \$69.38 |
| 2012 | \$52.55 | \$52.29 | \$31.38 | \$27.42 | \$39.36 | n/a | n/a | \$54.89 |
| 2013 | \$44.55 | \$54.61 | \$28.80 | \$23.71 | \$34.98 | n/a | n/a | \$57.54 |
| 2014 | \$43.30 | \$63.74 | \$25.67 | \$21.90 | \$18.47 | \$17.56 | \$34.37 | \$50.05 |
| 2015 | \$43.55 | \$63.02 | \$28.15 | \$21.44 | \$17.60 | \$15.87 | \$25.96 | \$55.49 |
| 2016 | \$46.47 | \$50.68 | \$15.57 | \$17.61 | \$14.98 | \$14.35 | \$23.56 | \$51.81 |
| CAGR | -2.5% | -6.0% | -12.2% | -5.6% | -17.1% | -9.6% | -17.2% | -6.2% |

CAGR: Compound Annual Growth Rate from 2010 to 2016
n/a: not available

Figure D. 4.2: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

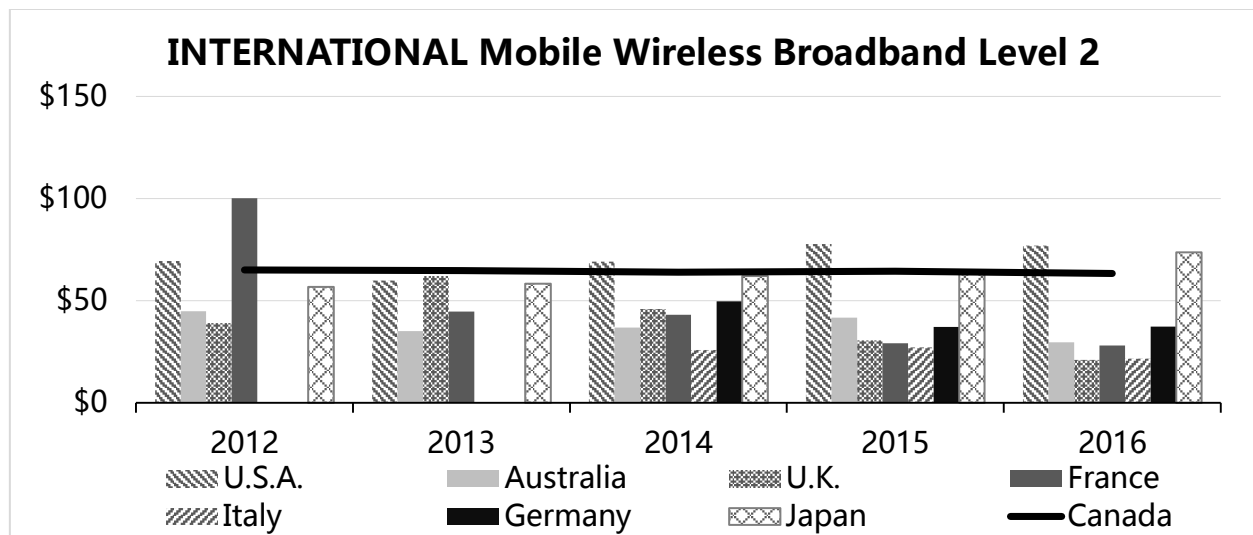


Table D. 4.2: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

Level 2: 5 GB to less than 10 GB

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|---------|-----------|---------|----------|---------|---------|---------|
| 2012 | \$65.11 | \$69.51 | \$44.85 | \$39.11 | \$100.15 | n/a | n/a | \$56.77 |
| 2013 | \$64.67 | \$59.82 | \$35.13 | \$62.01 | \$44.65 | n/a | n/a | \$58.24 |
| 2014 | \$63.90 | \$69.05 | \$36.80 | \$45.93 | \$43.04 | \$25.86 | \$49.70 | \$62.04 |
| 2015 | \$64.48 | \$77.72 | \$41.69 | \$30.60 | \$29.18 | \$27.05 | \$37.17 | \$63.82 |
| 2016 | \$63.30 | \$76.93 | \$29.67 | \$21.07 | \$28.11 | \$21.71 | \$37.31 | \$73.74 |
| CAGR | -0.7% | 2.6% | -9.8% | -14.3% | -27.2% | -8.4% | -13.4% | 6.8% |

CAGR: Compound Annual Growth Rate from 2012 to 2016
n/a: not available

Figure D. 4.3: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

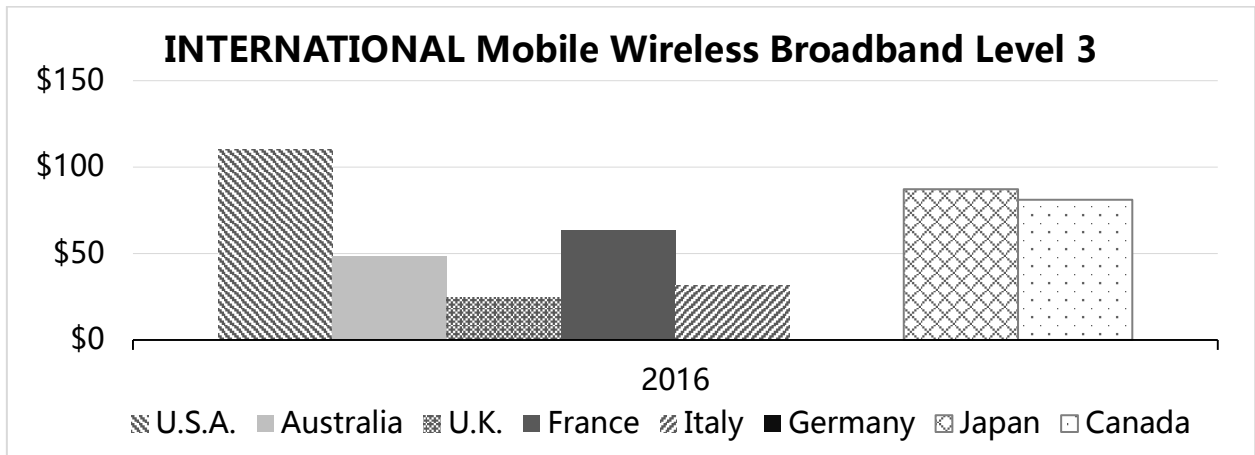


Table D. 4.3: International Mobile Wireless Internet Service Basket Prices (PPP-Adjusted CA\$)

Level 3: 10 GB and more

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|---------|----------|-----------|---------|---------|---------|---------|---------|
| 2016 | \$80.98 | \$110.38 | \$48.17 | \$24.47 | \$63.45 | \$31.58 | n/a | \$87.09 |

n/a: not available

Figure D. 5.1: International Bundled Services Prices (PPP-Adjusted CA\$)

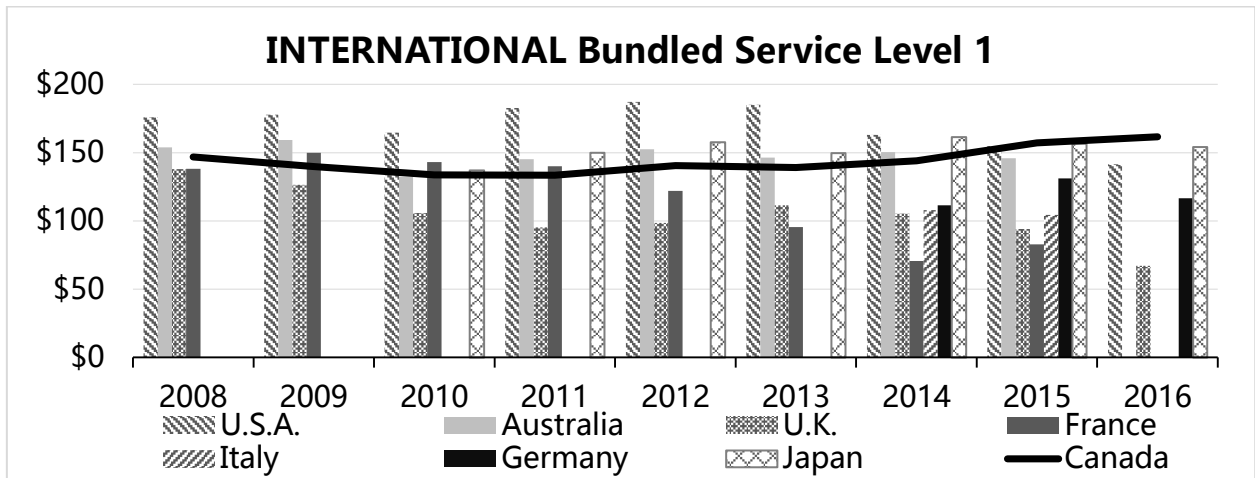


Table D. 5.1: International Bundled Service Basket Prices (PPP-Adjusted CA\$)

Level 1: Wireline, Wireless & Fixed Broadband

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 2008 | \$146.96 | \$175.99 | \$153.82 | \$137.87 | \$138.18 | n/a | n/a | n/a |
| 2009 | \$139.86 | \$177.74 | \$159.31 | \$126.45 | \$149.89 | n/a | n/a | n/a |
| 2010 | \$133.83 | \$164.61 | \$132.28 | \$105.80 | \$143.16 | n/a | n/a | \$137.08 |
| 2011 | \$133.50 | \$182.65 | \$145.28 | \$95.36 | \$140.15 | n/a | n/a | \$149.91 |
| 2012 | \$140.47 | \$187.07 | \$152.47 | \$98.57 | \$121.94 | n/a | n/a | \$157.73 |
| 2013 | \$139.15 | \$185.00 | \$146.45 | \$111.39 | \$95.62 | n/a | n/a | \$149.63 |
| 2014 | \$143.95 | \$163.11 | \$150.32 | \$105.40 | \$70.56 | \$107.94 | \$111.52 | \$161.38 |
| 2015 | \$157.20 | \$154.78 | \$145.98 | \$94.07 | \$82.75 | \$104.39 | \$131.06 | \$156.57 |
| 2016 | \$161.63 | \$141.40 | n/a | \$67.19 | n/a | n/a | \$116.68 | \$154.11 |
| CAGR | 1.2% | -2.7% | -0.7% | -8.6% | -7.1% | -3.3% | 2.3% | 2.0% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 5.2: International Bundled Services Prices (PPP-Adjusted CA\$)

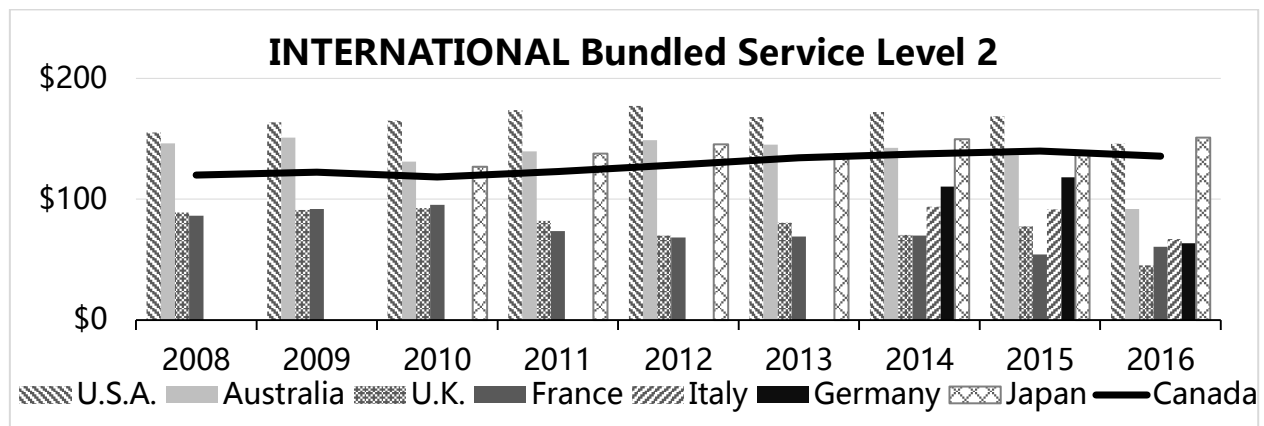


Table D. 5.2 International Bundled Service Basket Prices (PPP-Adjusted CA\$)

Level 2: Wireline, Fixed Broadband & TV

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|---------|---------|---------|----------|----------|
| 2008 | \$119.93 | \$155.09 | \$146.07 | \$88.88 | \$86.41 | n/a | n/a | n/a |
| 2009 | \$122.43 | \$163.81 | \$150.86 | \$91.21 | \$91.78 | n/a | n/a | n/a |
| 2010 | \$118.41 | \$164.95 | \$131.00 | \$92.72 | \$95.34 | n/a | n/a | \$126.99 |
| 2011 | \$122.87 | \$173.88 | \$139.49 | \$82.21 | \$73.72 | n/a | n/a | \$137.73 |
| 2012 | \$128.44 | \$177.15 | \$148.88 | \$69.98 | \$68.23 | n/a | n/a | \$145.47 |
| 2013 | \$134.19 | \$167.92 | \$145.27 | \$80.55 | \$69.17 | n/a | n/a | \$137.23 |
| 2014 | \$137.51 | \$172.07 | \$142.49 | \$70.32 | \$69.91 | \$93.79 | \$110.38 | \$149.72 |
| 2015 | \$139.78 | \$168.62 | \$136.44 | \$77.54 | \$54.35 | \$91.64 | \$118.08 | \$136.93 |
| 2016 | \$135.60 | \$145.92 | \$91.85 | \$45.17 | \$60.55 | \$66.94 | \$63.54 | \$151.08 |
| CAGR | 1.5% | -0.8% | -5.6% | -8.1% | -4.3% | -15.5% | -24.1% | 2.9% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

Figure D. 5.3: International Bundled Services Prices (PPP-Adjusted CA\$)

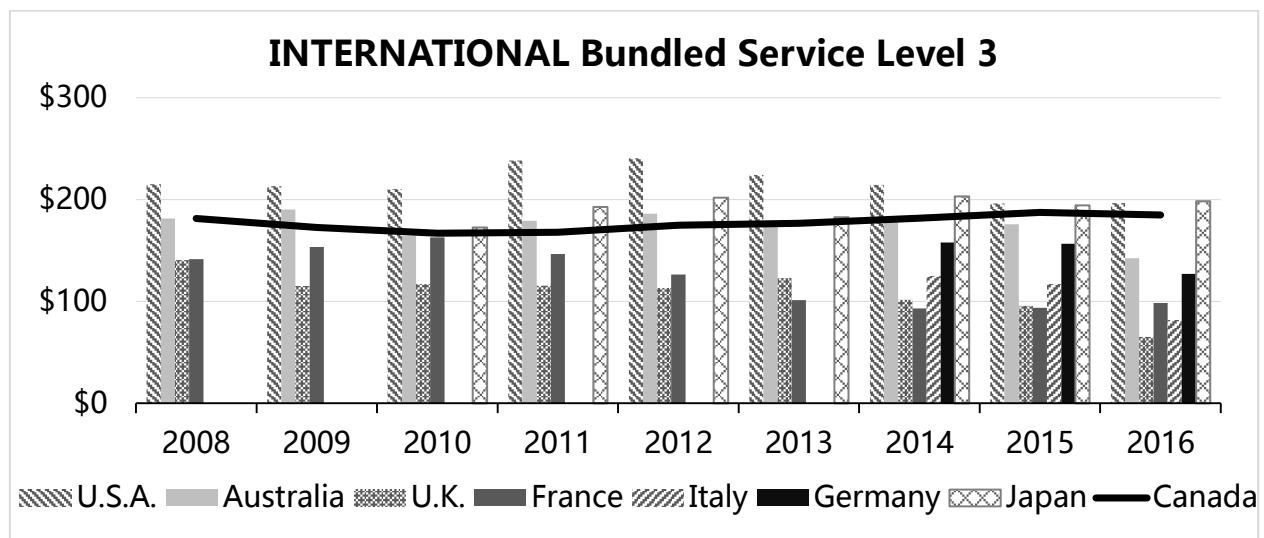


Table D. 5.3: International Bundled Service Basket Prices (PPP-Adjusted CA\$)

Level 3: Wireline, Wireless, Fixed Broadband & TV

| Year | Canada | U.S.A. | Australia | U.K. | France | Italy | Germany | Japan |
|------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 2008 | \$181.31 | \$215.13 | \$181.60 | \$140.62 | \$141.43 | n/a | n/a | n/a |
| 2009 | \$172.68 | \$213.23 | \$190.36 | \$115.19 | \$153.35 | n/a | n/a | n/a |
| 2010 | \$167.01 | \$210.52 | \$164.62 | \$117.04 | \$162.78 | n/a | n/a | \$172.52 |
| 2011 | \$167.81 | \$238.27 | \$179.27 | \$115.51 | \$146.56 | n/a | n/a | \$192.70 |
| 2012 | \$174.71 | \$240.65 | \$186.13 | \$113.31 | \$126.39 | n/a | n/a | \$202.02 |
| 2013 | \$176.80 | \$224.09 | \$178.24 | \$122.98 | \$101.35 | n/a | n/a | \$182.62 |
| 2014 | \$181.70 | \$214.39 | \$182.43 | \$101.52 | \$93.21 | \$124.94 | \$157.98 | \$202.99 |
| 2015 | \$187.33 | \$196.20 | \$175.67 | \$95.72 | \$93.64 | \$116.97 | \$156.78 | \$194.36 |
| 2016 | \$185.06 | \$196.70 | \$142.45 | \$65.27 | \$98.63 | \$81.91 | \$127.15 | \$198.54 |
| CAGR | 0.3% | -1.1% | -3.0% | -9.1% | -4.4% | -19.0% | -10.3% | 2.4% |

CAGR: Compound Annual Growth Rate from 2008 to 2016
n/a: not available

APPENDIX E: MOBILE WIRELESS – BRING YOUR OWN DEVICE (BYOD) ANALYSIS

Table E. 1: Overview of Wireless Device Options for Consumers (Bring Your Own Device versus Fixed Term Contract)

Analysis 1:

| Service Provider | Lite Device Brand Model | With BYOD: Lite Device | | | | Without BYOD | | Subsidy on retail price (see note 3) (C - D)/A x 100 |
|-------------------------|----------------------------|------------------------|----------------------|--------------------------|------------------------|------------------------|--------------|---|
| | | Purchase Price | Monthly Rate Savings | Present Worth of Savings | Net Cost to Subscriber | Contract Term (Months) | Upfront Cost | |
| | | A | | B (see note 2) | C = A - B | | D | |
| Bell | Alcatel Onetouch Idol 3 | \$349.95 | n/a | - | \$ 349.95 | 24 | n/a | n/a |
| TELUS | Alcatel Idol 3 | \$360.00 | \$ 5.00 | \$ 118.15 | \$ 241.85 | 24 | n/a | n/a |
| Rogers | Samsung Galaxy A5 | \$399.99 | n/a | - | \$ 399.99 | 24 | n/a | n/a |
| MTS | LG G3 Vigor | \$399.00 | n/a | - | \$ 399.00 | 24 | n/a | n/a |
| Sasktel | Blackberry Leap | \$349.99 | n/a | - | \$ 349.99 | 24 | n/a | n/a |
| Fido - Flanker (Rogers) | LG G Stylo | \$300.00 | \$ 10.00 | \$ 236.29 | \$ 63.71 | 24 | n/a | n/a |
| Virgin - Flanker (Bell) | Sony Xperia M4 Aqua | \$349.00 | \$ 10.00 | \$ 236.29 | \$ 112.71 | 24 | n/a | n/a |
| Koodo - Flanker (TELUS) | Alcatel Onetouch Idol 3 | \$312.00 | \$ 7.00 | \$ 165.40 | \$ 146.60 | 24 | n/a | n/a |
| Eastlink - New Entrant | Samsung Galaxy Grand Prime | \$288.00 | \$ 7.00 | \$ 165.40 | \$ 122.60 | 24 | n/a | n/a |
| Videotron - New Entrant | LG G4 VIGOR | \$329.95 | \$ 13.00 | \$ 307.18 | \$ 22.77 | 24 | n/a | n/a |
| Primus - MVNO | Samsung Galaxy Core LTE | \$309.00 | \$ 3.00 | \$ 70.89 | \$ 238.11 | 24 | n/a | n/a |
| PC Mobile - MVNO | LG G3 | \$360.00 | \$ 14.00 | \$ 330.81 | \$ 29.19 | 24 | n/a | n/a |
| Wind - New Entrant | LG G Stylo | \$349.00 | \$ 15.00 | \$ 354.44 | (\$ 5.44) | 24 | n/a | n/a |

1) Chatr and Mobilicity (Flankers – Rogers) and Speakout (7-eleven), PC Mobile, PetroCanada (MVNOs) only offer pre-paid plans.
2) Present Worth of savings calculated using 2-year risk free bond yield, estimated to be 1.5% per annum over 24 months
3) Subsidy calculations do not consider operational/business factors from service provider's perspective such as impact on churn rate, ARPU, and ordering cost etc.

Table E. 2: Overview of Wireless Device Options for Consumers (Bring Your Own Device versus Fixed Term Contract)

Analysis 2:

| Service Provider | Premium Device Brand Model | With BYOD: Premium Device | | | | Without BYOD | | Subsidy on retail price (see note 3) (C - D)/A x 100 |
|-----------------------|----------------------------|--------------------------------|----------------------|--------------------------|------------------------|------------------------|--------------|---|
| | | Purchase Price | Monthly Rate Savings | Present Worth of Savings | Net Cost to Subscriber | Contract Term (Months) | Upfront Cost | |
| | | A | | B (see note 2) | (C) = (A) - (B) | | D | |
| Bell | iPhone 6s 16GB | \$914.99 | \$ 10.00 | \$ 236.29 | \$ 678.70 | 24 | \$ 398.00 | 30.7% |
| TELUS | iPhone 6s 16GB | \$915.00 | \$ 15.00 | \$ 354.44 | \$ 560.56 | 24 | \$ 400.00 | 17.5% |
| Rogers | iPhone 6s 16GB | \$899.99 | \$ 10.00 | \$ 236.29 | \$ 663.70 | 24 | \$ 399.90 | 29.3% |
| MTS | iPhone 6s 16GB | \$899.99 | - | - | \$ 899.99 | 24 | \$ 399.00 | 55.7% |
| Sasktel | iPhone 6s 16GB | \$914.99 | | - | \$ 914.99 | 24 | \$ 398.00 | 56.5% |
| Fido-Flanker (Rogers) | iPhone 6s 16GB | \$899.99 | \$ 15.00 | \$ 354.44 | \$ 545.55 | 24 | \$ 399.00 | 16.3% |
| Virgin-Flanker (Bell) | iPhone 6s 16GB | \$914.99 | \$ 15.00 | \$ 354.44 | \$ 560.55 | 24 | \$ 398.99 | 17.7% |
| Koodo-Flanker (TELUS) | iPhone 6 16GB | \$774.00 | \$ 15.00 | \$ 354.44 | \$ 419.56 | 24 | \$ 414.00 | 0.7% |
| Eastlink-New Entrant | iPhone 6 16GB | \$899.99 | \$ 31.21 | \$ 737.46 | \$ 162.53 | 24 | n/a | n/a |
| Videotron-New Entrant | iPhone 6 16GB | \$899.99 | \$ 21.00 | \$ 496.21 | \$ 403.78 | 24 | \$ 319.95 | 9.3% |
| Primus-MVNO | - | Does not offer premium devices | | | | n/a | | n/a |
| PC Mobile-MVNO | - | Does not offer premium devices | | | | n/a | | n/a |
| Wind-New Entrant | Samsung Galaxy N5 | \$849.00 | \$ 5.00 | \$ 118.15 | \$ 730.85 | 24 | \$ 299.00 | 50.9% |

1) Chatr and Mobilicity (Flankers – Rogers) and Speakout (7-eleven), PC Mobile, PetroCanada (MVNOs) only offer pre-paid plans.

2) Present Worth of savings calculated using 2-year risk free bond yield, estimated to be 1.5% per annum over 24 months

3) Subsidy calculations do not consider operational/business factors from service provider's perspective such as impact on churn rate, ARPU, and ordering cost etc.