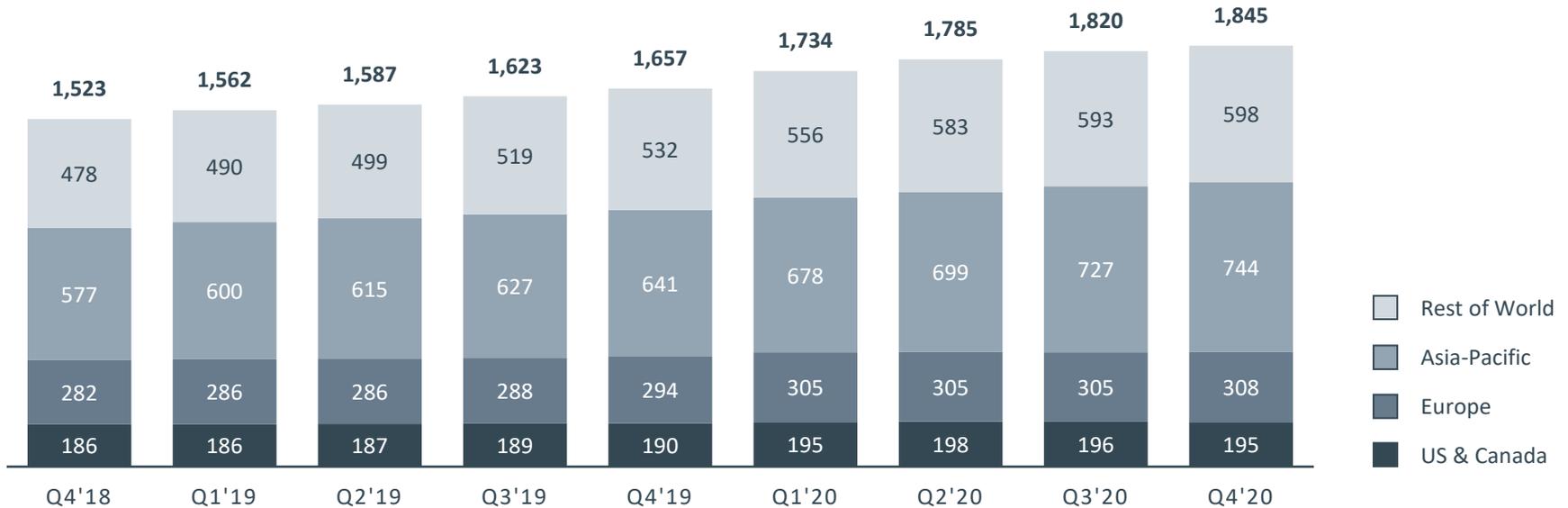# FB Earnings Presentation Q4 2020

FACEBOOK

Facebook Daily Active Users (DAUs)

In Millions

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	1,523	1,562	1,587	1,623	1,657	1,734	1,785	1,820	1,845
Rest of World	478	490	499	519	532	556	583	593	598
Asia-Pacific	577	600	615	627	641	678	699	727	744
Europe	282	286	286	288	294	305	305	305	308
US & Canada	186	186	187	189	190	195	198	196	195

DAUs/MAUs
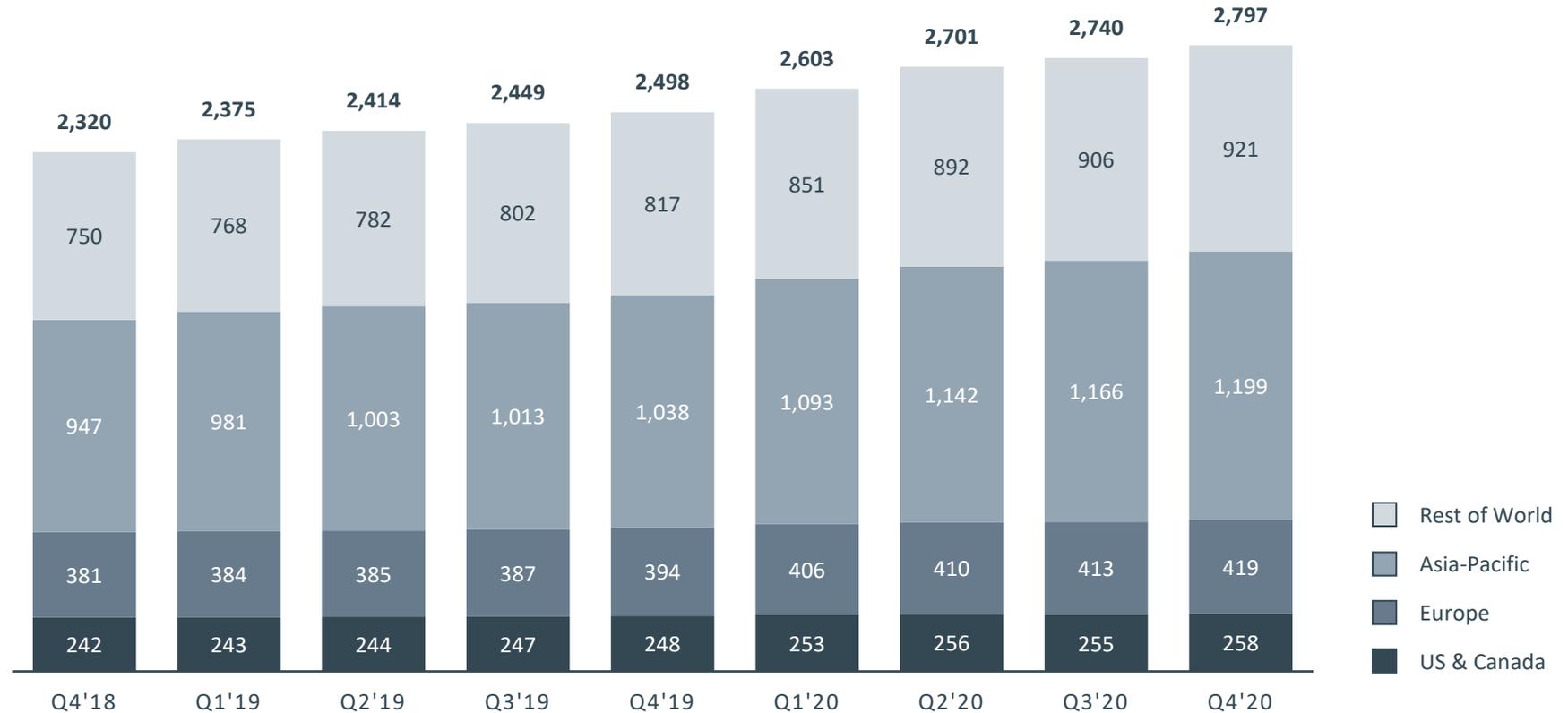
Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
66%	66%	66%	66%	66%	67%	66%	66%	66%

Please see Facebook's most recent quarterly or annual report filed with the SEC for definitions of user activity used to determine the number of our Facebook DAUs and MAUs. The numbers for DAUs and MAUs do not include users on Instagram, WhatsApp, or our other products unless they would otherwise qualify as DAUs or MAUs, respectively, based on their other activities on Facebook.

Facebook Monthly Active Users (MAUs)

In Millions

FACEBOOK

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	2,320	2,375	2,414	2,449	2,498	2,603	2,701	2,740	2,797
Rest of World	750	768	782	802	817	851	892	906	921
Asia-Pacific	947	981	1,003	1,013	1,038	1,093	1,142	1,166	1,199
Europe	381	384	385	387	394	406	410	413	419
US & Canada	242	243	244	247	248	253	256	255	258

Please see Facebook's most recent quarterly or annual report filed with the SEC for definitions of user activity used to determine the number of our Facebook DAUs and MAUs. The numbers for DAUs and MAUs do not include users on Instagram, WhatsApp, or our other products unless they would otherwise qualify as DAUs or MAUs, respectively, based on their other activities on Facebook.

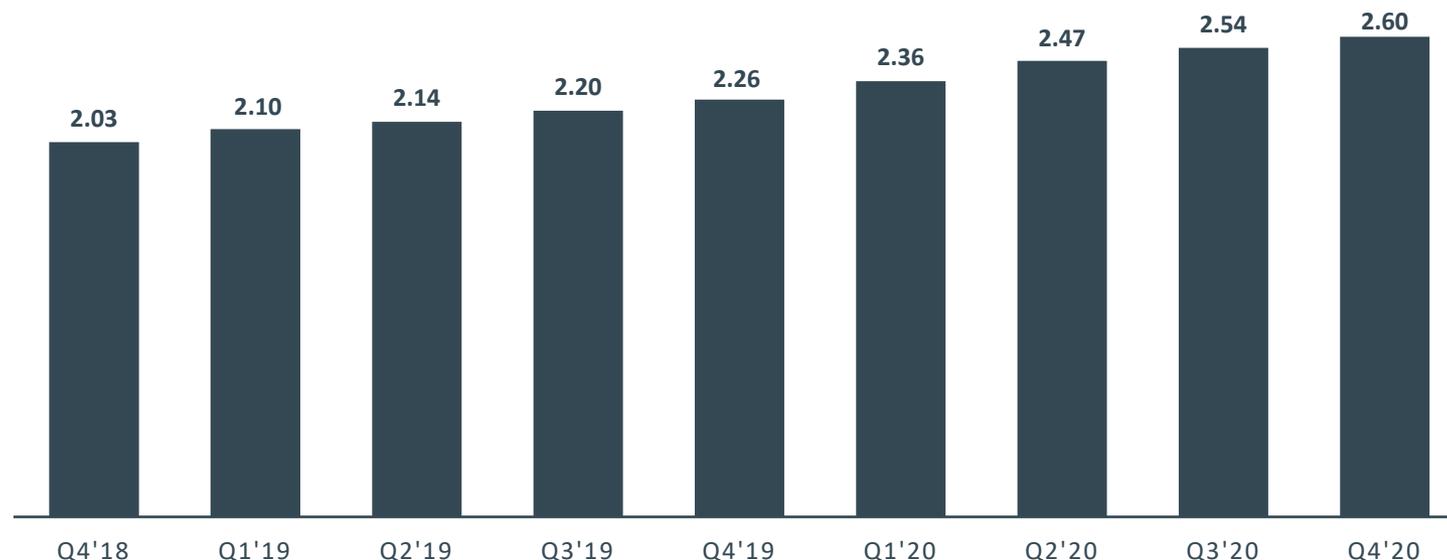# Facebook Average Revenue per User (ARPU)

FACEBOOK

Worldwide

	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$8.52	$6.95	$7.05	$7.89	$10.14
Other	$0.14	$0.12	$0.14	$0.09	$0.32
Advertising	$8.38	$6.84	$6.91	$7.80	$9.82

US & Canada

	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$41.41	$34.18	$36.49	$39.63	$53.56
Other	$0.92	$0.73	$0.91	$0.58	$2.28
Advertising	$40.50	$33.45	$35.58	$39.04	$51.28

Europe

	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$13.21	$10.64	$11.03	$12.41	$16.87
Other	$0.23	$0.21	$0.22	$0.13	$0.45
Advertising	$12.99	$10.43	$10.81	$12.28	$16.41

Asia-Pacific

	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$3.57	$3.06	$2.99	$3.67	$4.05
Other	$0.02	$0.02	$0.03	$0.02	$0.08
Advertising	$3.55	$3.04	$2.96	$3.64	$3.98

Rest of World

	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$2.48	$1.99	$1.78	$2.22	$2.77
Other	$0.01	$0.01	$0.02	$0.02	$0.02
Advertising	$2.47	$1.98	$1.77	$2.20	$2.75

Legend:
- Other
- Advertising

Please see Facebook's most recent quarterly or annual report filed with the SEC for the definition of ARPU.

Revenue by Facebook user geography is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue disaggregated by geography disclosure in our condensed consolidated financial statements where revenue is disaggregated by geography based on the addresses of our customers.

Family Daily Active People (DAP)

In Billions

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
DAP	2.03	2.10	2.14	2.20	2.26	2.36	2.47	2.54	2.60

DAP/MAP

| Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
77%	78%	78%	78%	78%	79%	79%	79%	79%

We define a daily active person (DAP) as a registered and logged-in user of Facebook, Instagram, Messenger, and/or WhatsApp (collectively, our "Family" of products) who visited at least one of these Family products through a mobile device application or using a web or mobile browser on a given day.

The numbers for DAP do not include users on our other products unless they would otherwise qualify as DAP based on their other activities on our Family products.

We do not require people to use a common identifier or link their accounts to use multiple products in our Family, and therefore must seek to attribute multiple user accounts within and across products to individual people. Our calculations of DAP rely upon complex techniques, algorithms, and machine learning models that seek to estimate the underlying number of unique people using one or more of these products, including by matching user accounts within an individual product and across multiple products when we believe they are attributable to a single person, and counting such group of accounts as one person. As these techniques and models require significant judgment, are developed based on internal reviews of limited samples of user accounts, and are calibrated against user survey data, there is necessarily some margin of error in our estimates. For additional information, see "Limitations of Key Metrics and Other Data" located in the Appendix of this presentation. In the second quarter of 2020, we updated our Family metrics calculations to reflect recent data from a periodic WhatsApp user survey and to incorporate certain methodology improvements, and we estimate such updates contributed an aggregate of approximately 40 million DAP to our reported worldwide DAP in June 2020.

Family Monthly Active People (MAP)

In Billions

2.64	2.69	2.76	2.82	2.89	2.99	3.14	3.21	3.30
Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
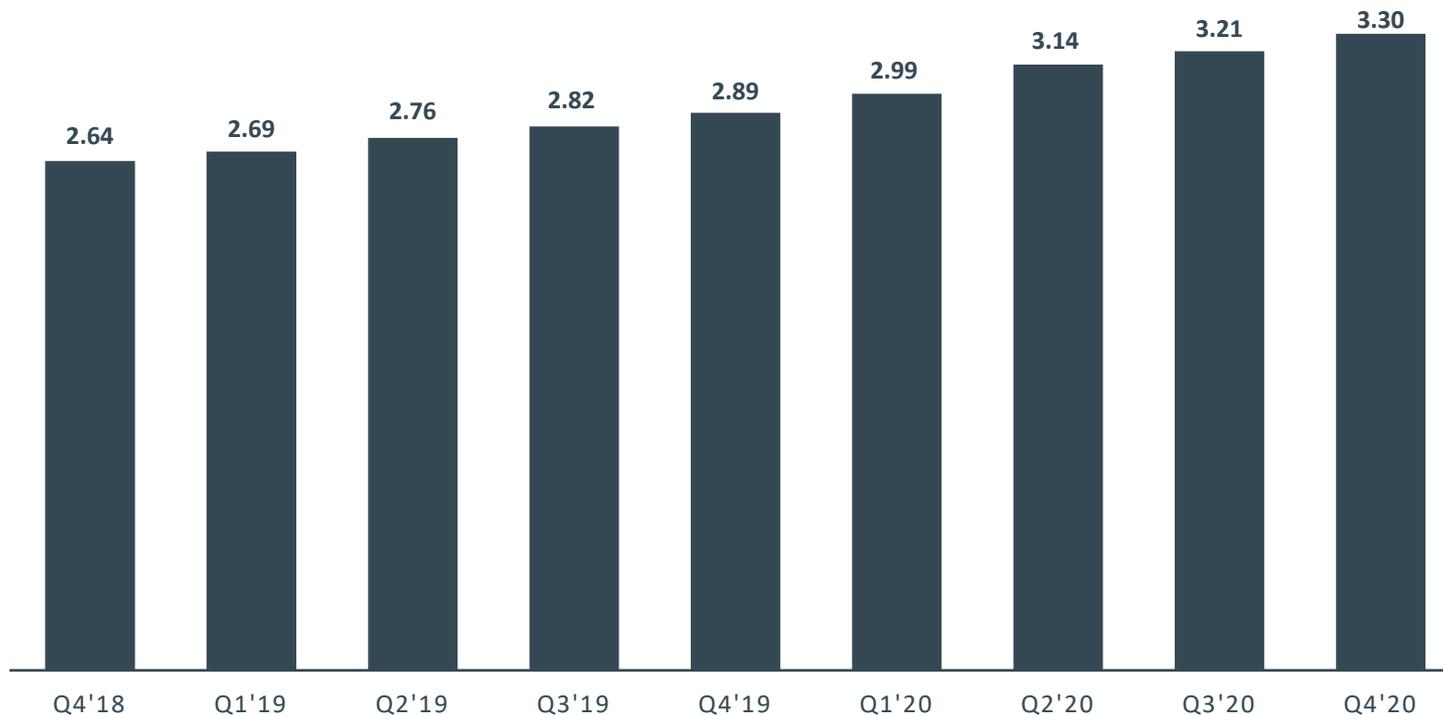
We define a monthly active person (MAP) as a registered and logged-in user of Facebook, Instagram, Messenger, and/or WhatsApp (collectively, our "Family" of products) who visited at least one of these Family products through a mobile device application or using a web or mobile browser in the last 30 days as of the date of measurement.

The numbers for MAP do not include users on our other products unless they would otherwise qualify as MAP based on their other activities on our Family products.

We do not require people to use a common identifier or link their accounts to use multiple products in our Family, and therefore must seek to attribute multiple user accounts within and across products to individual people. Our calculations of MAP rely upon complex techniques, algorithms, and machine learning models that seek to estimate the underlying number of unique people using one or more of these products, including by matching user accounts within an individual product and across multiple products when we believe they are attributable to a single person, and counting such group of accounts as one person. As these techniques and models require significant judgment, are developed based on internal reviews of limited samples of user accounts, and are calibrated against user survey data, there is necessarily some margin of error in our estimates. For additional information, see "Limitations of Key Metrics and Other Data" located in the Appendix of this presentation. In the second quarter of 2020, we updated our Family metrics calculations to reflect recent data from a periodic WhatsApp user survey and to incorporate certain methodology improvements, and we estimate such updates contributed an aggregate of approximately 50 million MAP to our reported worldwide MAP in June 2020.
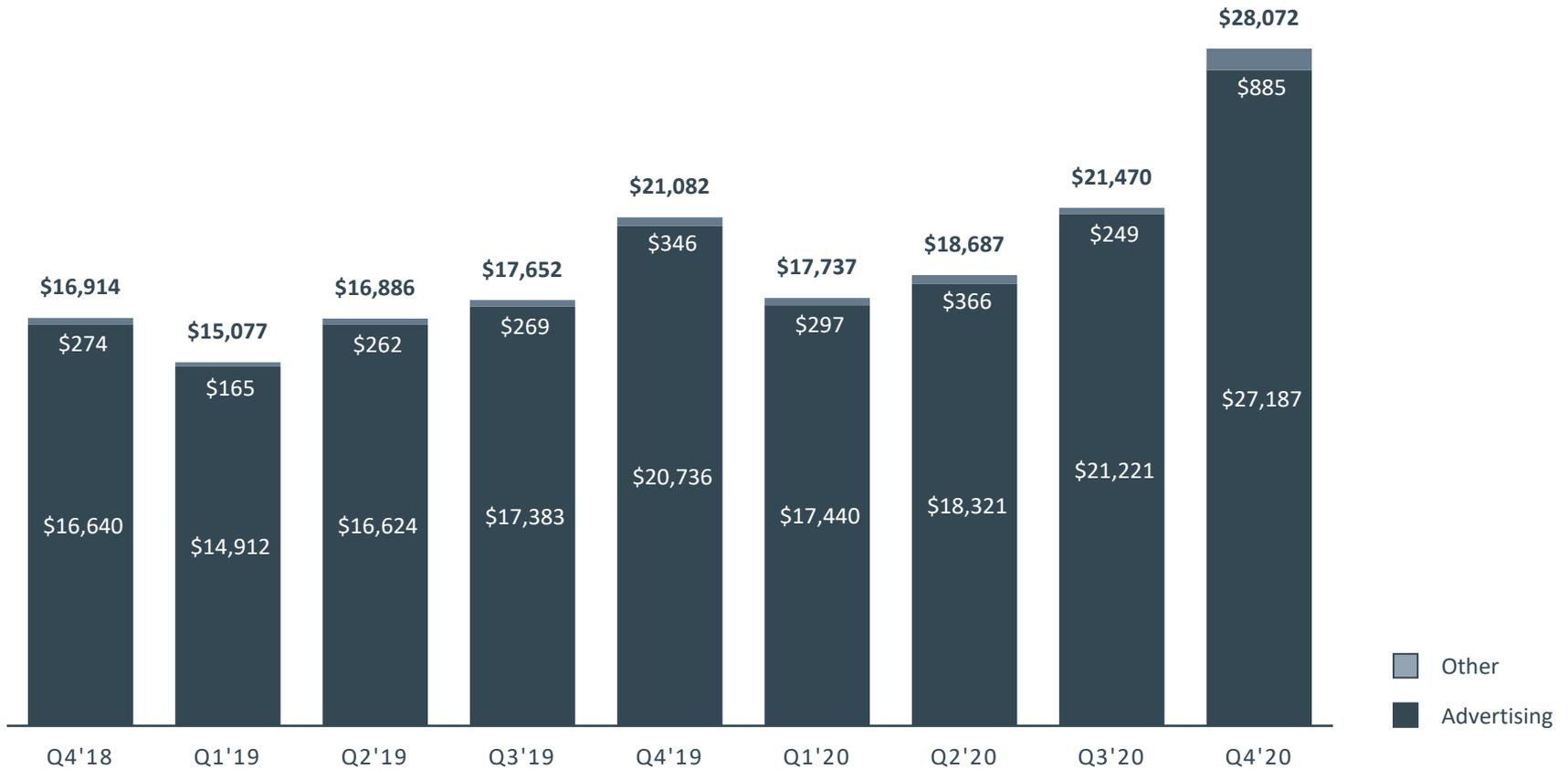
Family Average Revenue per Person (ARPP)

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	$6.52	$5.66	$6.20	$6.33	$7.38	$6.03	$6.10	$6.76	$8.62
Other	$0.11	$0.06	$0.10	$0.10	$0.12	$0.10	$0.12	$0.08	$0.27
Advertising	$6.41	$5.60	$6.10	$6.23	$7.26	$5.93	$5.98	$6.68	$8.35

Legend:
- Other
- Advertising

We define average revenue per person (ARPP) as our total revenue during a given quarter, divided by the average of the number of MAP at the beginning and end of the quarter. While ARPP includes all sources of revenue, the number of MAP used in this calculation only includes users of our Family products as described in the definition of MAP in the previous slide.

Revenue

In Millions

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20
Total	**$16,914**	**$15,077**	**$16,886**	**$17,652**	**$21,082**	**$17,737**	**$18,687**	**$21,470**	**$28,072**
Other	$274	$165	$262	$269	$346	$297	$366	$249	$885
Advertising	$16,640	$14,912	$16,624	$17,383	$20,736	$17,440	$18,321	$21,221	$27,187

Legend:
- Other
- Advertising

Revenue by Facebook User Geography

In Millions

Q4'18 — $16,914
- Rest of World: $1,571
- Asia-Pacific: $2,759
- Europe: $4,151
- US & Canada: $8,433

Q1'19 — $15,077
- Rest of World: $1,437
- Asia-Pacific: $2,682
- Europe: $3,650
- US & Canada: $7,308

Q2'19 — $16,886
- Rest of World: $1,650
- Asia-Pacific: $3,012
- Europe: $4,109
- US & Canada: $8,115

Q3'19 — $17,652
- Rest of World: $1,774
- Asia-Pacific: $3,267
- Europe: $4,124
- US & Canada: $8,487

Q4'19 — $21,082
- Rest of World: $2,010
- Asia-Pacific: $3,665
- Europe: $5,159
- US & Canada: $10,248

Q1'20 — $17,737
- Rest of World: $1,664
- Asia-Pacific: $3,257
- Europe: $4,254
- US & Canada: $8,562

Q2'20 — $18,687
- Rest of World: $1,553
- Asia-Pacific: $3,341
- Europe: $4,502
- US & Canada: $9,291

Q3'20 — $21,470
- Rest of World: $1,999
- Asia-Pacific: $4,230
- Europe: $5,104
- US & Canada: $10,137

Q4'20 — $28,072
- Rest of World: $2,534
- Asia-Pacific: $4,793
- Europe: $7,011
- US & Canada: $13,734

Legend:
- Rest of World
- Asia-Pacific
- Europe
- US & Canada

Revenue by Facebook user geography is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue disaggregated by geography disclosure in our condensed consolidated financial statements where revenue is disaggregated by geography based on the addresses of our customers.
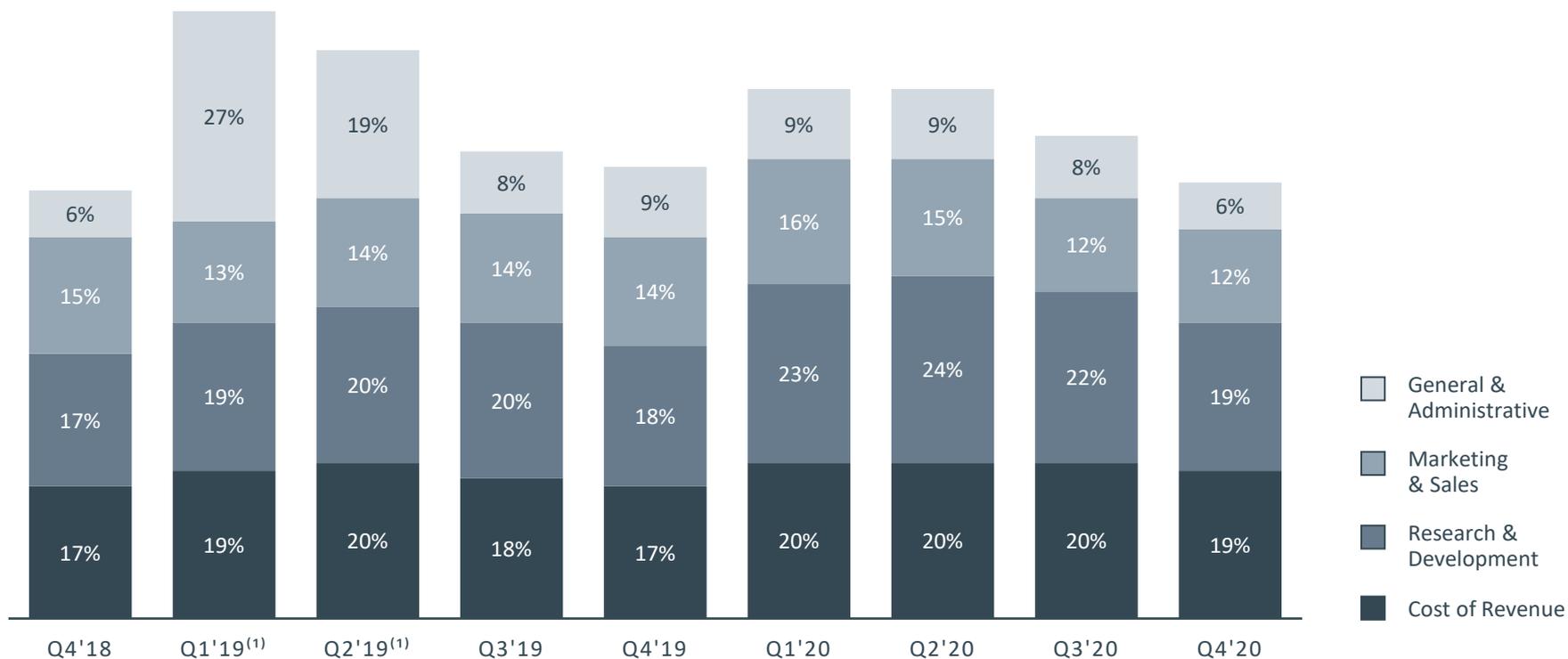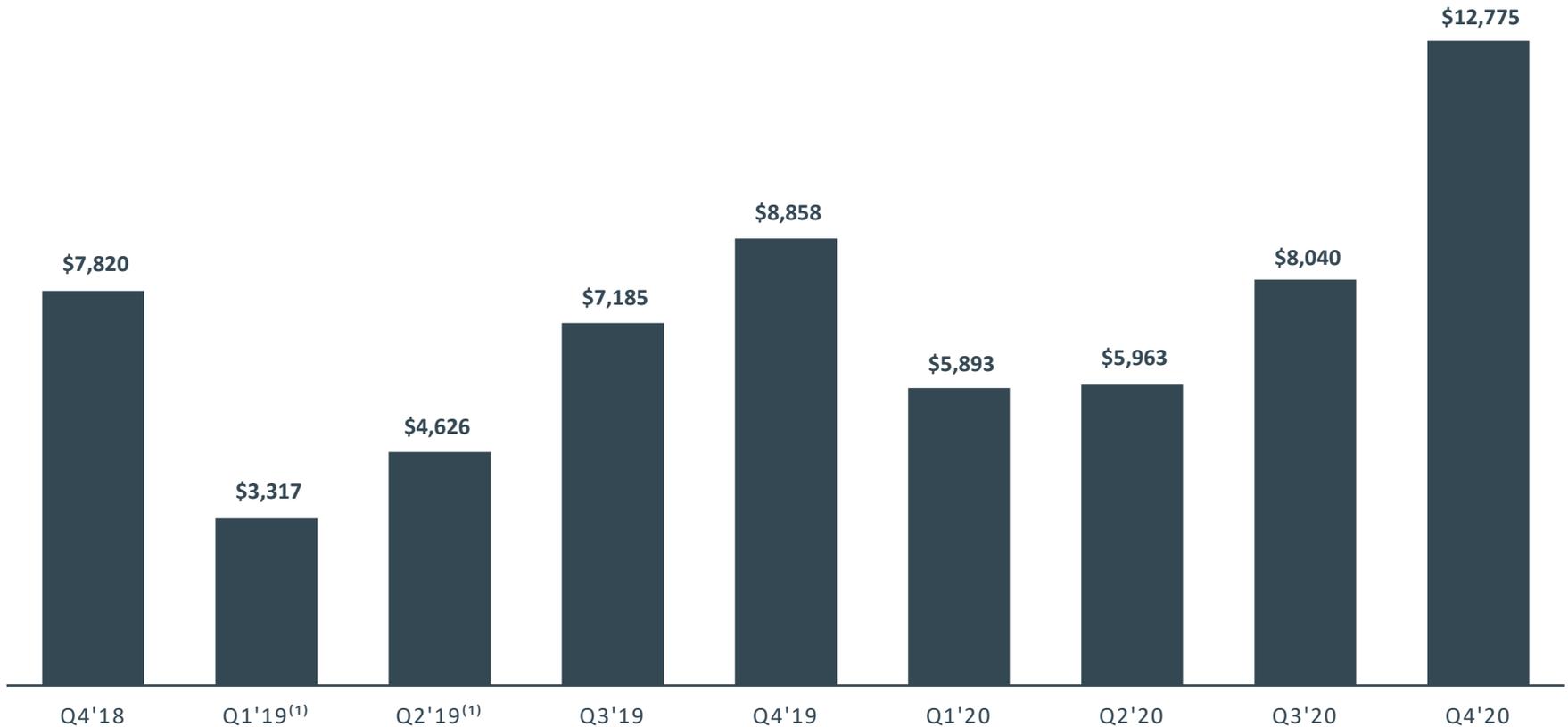
Advertising Revenue by Facebook User Geography
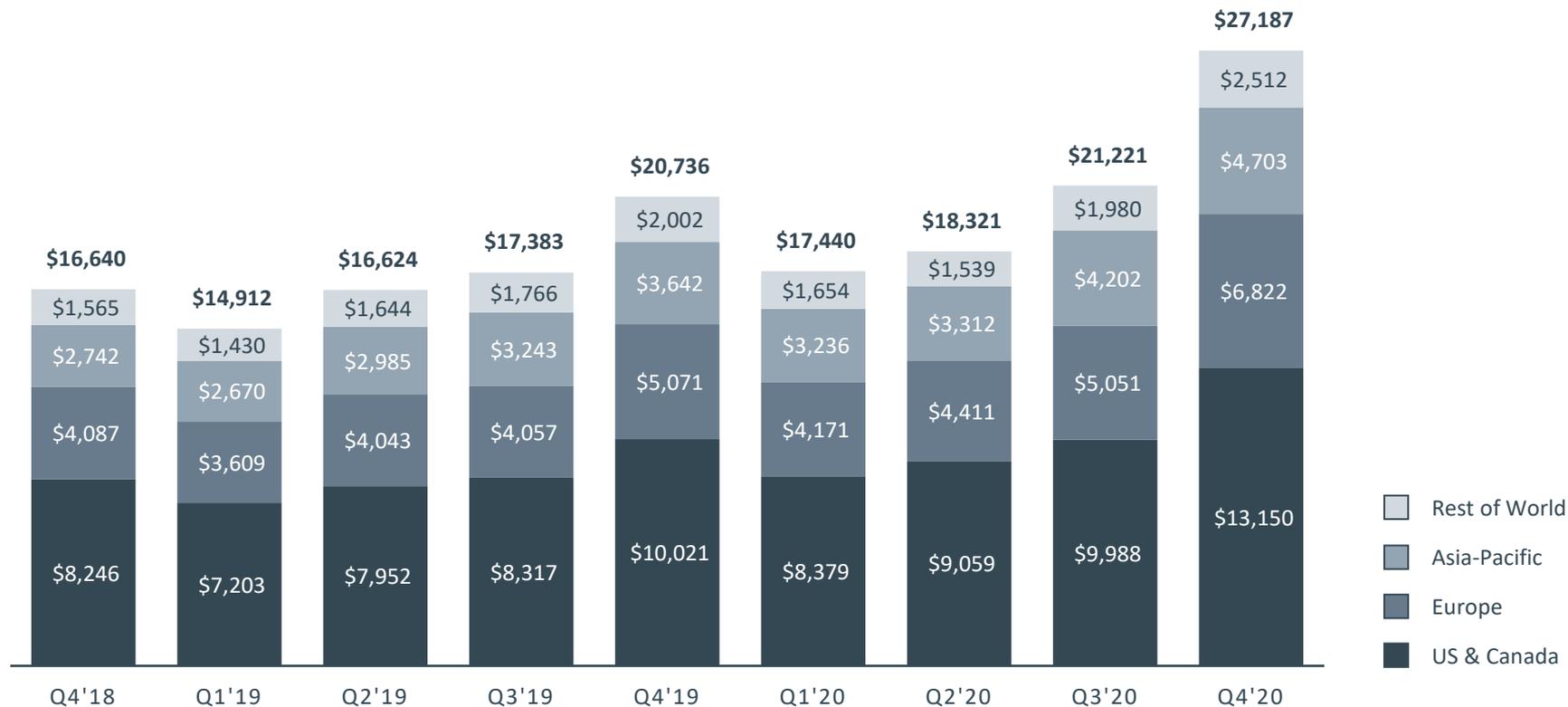
In Millions

FACEBOOK

Legend:
- Rest of World
- Asia-Pacific
- Europe
- US & Canada

Q4'18 — $16,640
- Rest of World: $1,565
- Asia-Pacific: $2,742
- Europe: $4,087
- US & Canada: $8,246

Q1'19 — $14,912
- Rest of World: $1,430
- Asia-Pacific: $2,670
- Europe: $3,609
- US & Canada: $7,203

Q2'19 — $16,624
- Rest of World: $1,644
- Asia-Pacific: $2,985
- Europe: $4,043
- US & Canada: $7,952

Q3'19 — $17,383
- Rest of World: $1,766
- Asia-Pacific: $3,243
- Europe: $4,057
- US & Canada: $8,317

Q4'19 — $20,736
- Rest of World: $2,002
- Asia-Pacific: $3,642
- Europe: $5,071
- US & Canada: $10,021

Q1'20 — $17,440
- Rest of World: $1,654
- Asia-Pacific: $3,236
- Europe: $4,171
- US & Canada: $8,379

Q2'20 — $18,321
- Rest of World: $1,539
- Asia-Pacific: $3,312
- Europe: $4,411
- US & Canada: $9,059

Q3'20 — $21,221
- Rest of World: $1,980
- Asia-Pacific: $4,202
- Europe: $5,051
- US & Canada: $9,988

Q4'20 — $27,187
- Rest of World: $2,512
- Asia-Pacific: $4,703
- Europe: $6,822
- US & Canada: $13,150

Revenue by Facebook user geography is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue disaggregated by geography disclosure in our condensed consolidated financial statements where revenue is disaggregated by geography based on the addresses of our customers.

Other Revenue by Facebook User Geography
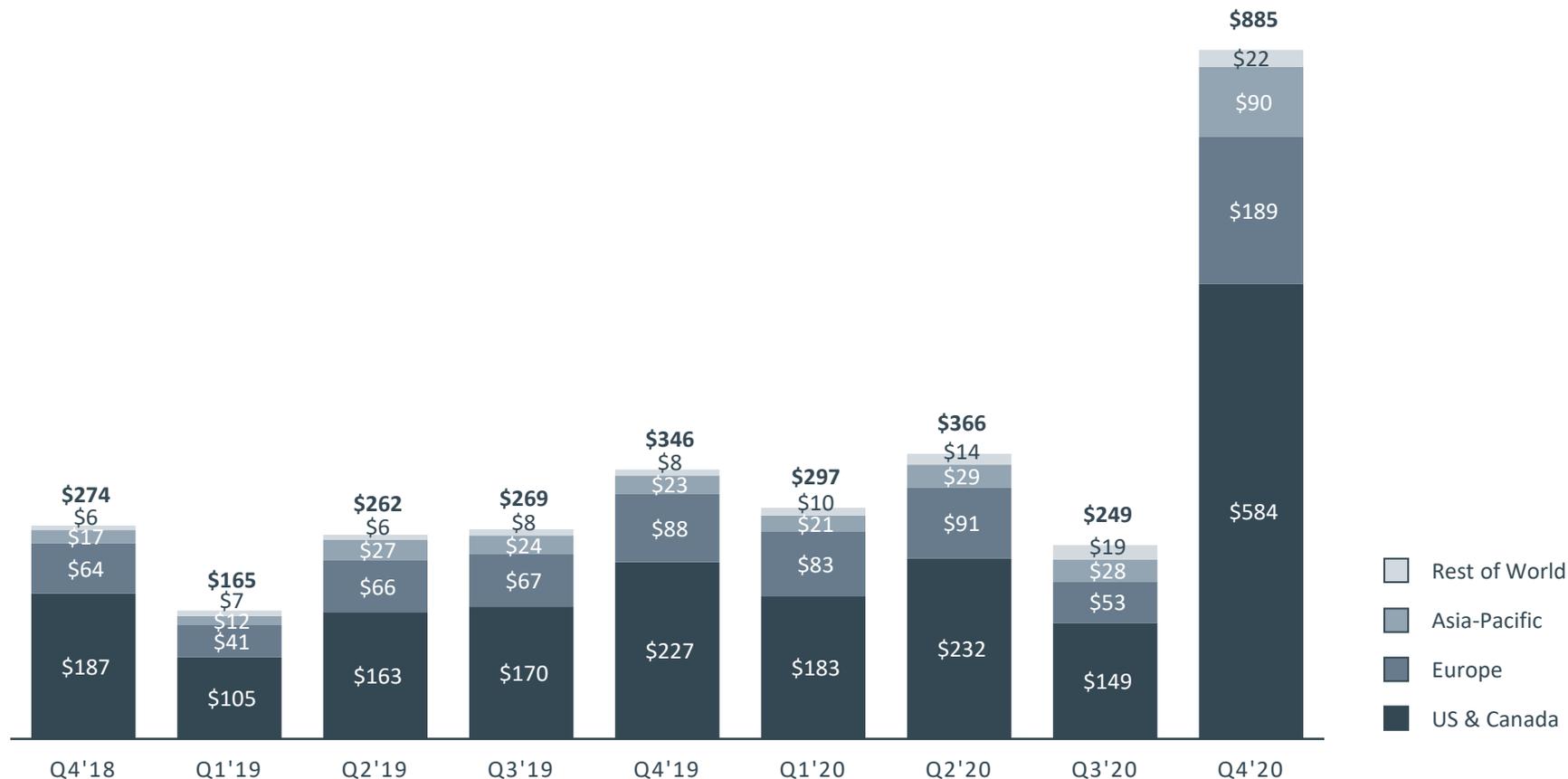
In Millions

FACEBOOK

$274
$6
$17
$64
$187

$165
$7
$12
$41
$105

$262
$6
$27
$66
$163

$269
$8
$24
$67
$170

$346
$8
$23
$88
$227

$297
$10
$21
$83
$183

$366
$14
$29
$91
$232

$249
$19
$28
$53
$149

$885
$22
$90
$189
$584

Q4'18 Q1'19 Q2'19 Q3'19 Q4'19 Q1'20 Q2'20 Q3'20 Q4'20

Rest of World
Asia-Pacific
Europe
US & Canada

Revenue by Facebook user geography is geographically apportioned based on our estimation of the geographic location of our users when they perform a revenue-generating activity. This allocation differs from our revenue disaggregated by geography disclosure in our condensed consolidated financial statements where revenue is disaggregated by geography based on the addresses of our customers.

Expenses as a Percentage of Revenue

Q4'18: General & Administrative 6%, Marketing & Sales 15%, Research & Development 17%, Cost of Revenue 17%

Q1'19[1]: General & Administrative 27%, Marketing & Sales 13%, Research & Development 19%, Cost of Revenue 19%

Q2'19[1]: General & Administrative 19%, Marketing & Sales 14%, Research & Development 20%, Cost of Revenue 20%

Q3'19: General & Administrative 8%, Marketing & Sales 14%, Research & Development 20%, Cost of Revenue 18%

Q4'19: General & Administrative 9%, Marketing & Sales 14%, Research & Development 18%, Cost of Revenue 17%

Q1'20: General & Administrative 9%, Marketing & Sales 16%, Research & Development 23%, Cost of Revenue 20%

Q2'20: General & Administrative 9%, Marketing & Sales 15%, Research & Development 24%, Cost of Revenue 20%

Q3'20: General & Administrative 8%, Marketing & Sales 12%, Research & Development 22%, Cost of Revenue 20%

Q4'20: General & Administrative 6%, Marketing & Sales 12%, Research & Development 19%, Cost of Revenue 19%

Legend:
- General & Administrative
- Marketing & Sales
- Research & Development
- Cost of Revenue

(1) Includes $3.0 billion and $2.0 billion in legal expenses accrued in the first quarter and second quarter of 2019, respectively, related to the U.S. Federal Trade Commission (FTC) settlement as discussed in our press releases furnished with our Reports on Form 8-K dated April 24, 2019 (Q1 2019 Press Release) and July 24, 2019 (Q2 2019 Press Release). These expenses are included in general and administrative expenses.

Income from Operations

In Millions

$7,820	$3,317	$4,626	$7,185	$8,858	$5,893	$5,963	$8,040	$12,775
Q4'18	Q1'19[1]	Q2'19[1]	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20

(1) Includes $3.0 billion and $2.0 billion in legal expenses accrued in the first quarter and second quarter of 2019, respectively, related to the FTC settlement as discussed in our Q1 2019 and Q2 2019 Press Releases.

Operating Margin
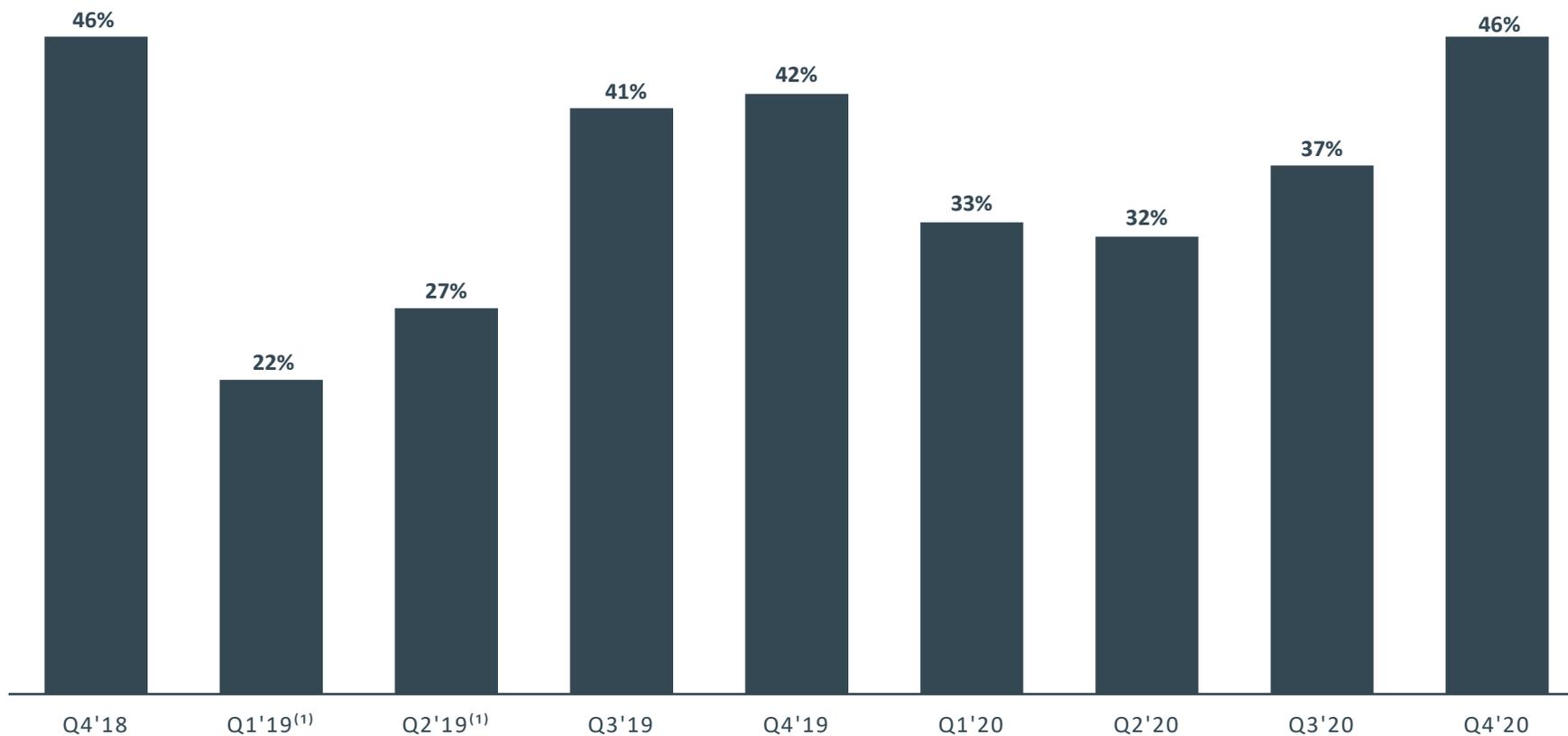
Bar chart showing Operating Margin by quarter:
- Q4'18: 46%
- Q1'19 (1): 22%
- Q2'19 (1): 27%
- Q3'19: 41%
- Q4'19: 42%
- Q1'20: 33%
- Q2'20: 32%
- Q3'20: 37%
- Q4'20: 46%

(1) Includes $3.0 billion and $2.0 billion in legal expenses accrued in the first quarter and second quarter of 2019, respectively, related to the FTC settlement as discussed in our Q1 2019 and Q2 2019 Press Releases. Excluding these expenses, our operating margin would have been 20 percentage points higher in Q1 2019 and 12 percentage points higher in Q2 2019.

Effective Tax Rate

In Millions, Except for Percentages

	Q4'18	Q1'19[1]	Q2'19[2]	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20[3]	Q4'20
Income before provision for income taxes	$ 7,971	$ 3,482	$ 4,832	$ 7,329	$ 9,169	$ 5,861	$ 6,131	$ 8,133	$ 13,055
Provision for income taxes	1,089	1,053	2,216	1,238	1,820	959	953	287	1,836
Effective Tax Rate	**14%**	**30%**	**46%**	**17%**	**20%**	**16%**	**16%**	**4%**	**14%**

(1) Includes a $3.0 billion legal expense accrued in the first quarter of 2019 related to the FTC matter as discussed in our Q1 2019 Press Release. As this expense is not expected to be tax-deductible, it had no effect on our provision for income taxes. Excluding this expense, our effective tax rate would have been 14 percentage points lower in Q1 2019.

(2) Includes an additional $2.0 billion legal expense accrued in the second quarter of 2019 related to the FTC settlement and $1.1 billion in income taxes due to the developments in Altera Corp. v. Commissioner as discussed in our Q2 2019 Press Release. As the FTC expense is not expected to be tax-deductible, it had no effect on our provision for income taxes. Excluding these expenses, our effective tax rate would have been 30 percentage points lower in Q2 2019.

(3) Reflects a one-time income tax benefit of $913 million related to the effects of a tax election to capitalize and amortize certain research and development expenses for U.S. income tax purposes. Excluding this tax benefit, our effective tax rate would have been 11 percentage points higher in Q3 2020.

Net Income
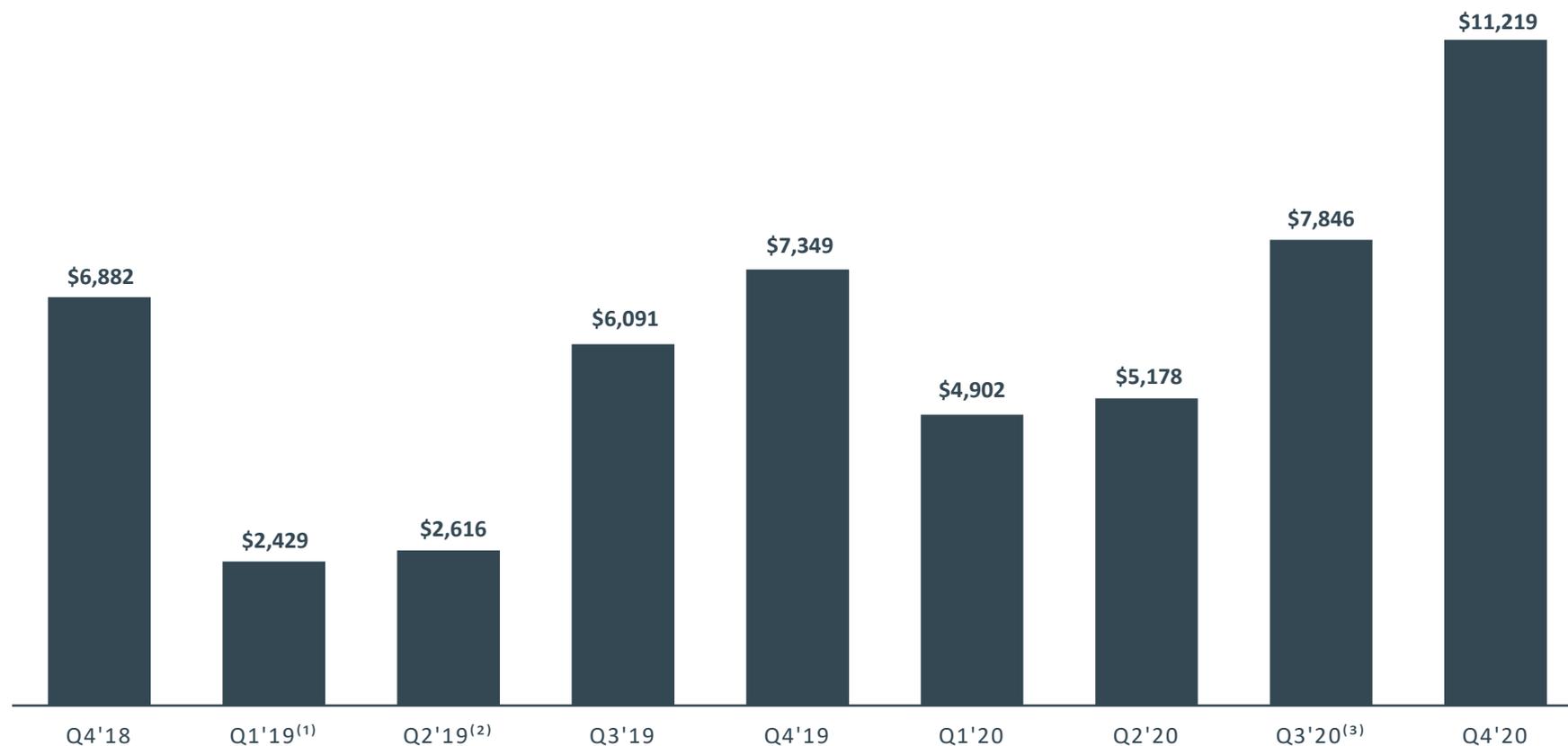
In Millions

Bar chart of Net Income (in millions):

- Q4'18: $6,882
- Q1'19[1]: $2,429
- Q2'19[2]: $2,616
- Q3'19: $6,091
- Q4'19: $7,349
- Q1'20: $4,902
- Q2'20: $5,178
- Q3'20[3]: $7,846
- Q4'20: $11,219

(1) Includes a $3.0 billion legal expense accrued in the first quarter of 2019 related to the FTC matter as discussed in our Q1 2019 Press Release.

(2) Includes an additional $2.0 billion legal expense accrued in the second quarter of 2019 related to the FTC settlement and $1.1 billion in income taxes due to the developments in Altera Corp. v. Commissioner as discussed in our Q2 2019 Press Release.

(3) Reflects a one-time income tax benefit of $913 million related to the effects of a tax election to capitalize and amortize certain research and development expenses for U.S. income tax purposes.

Diluted Earnings Per Share
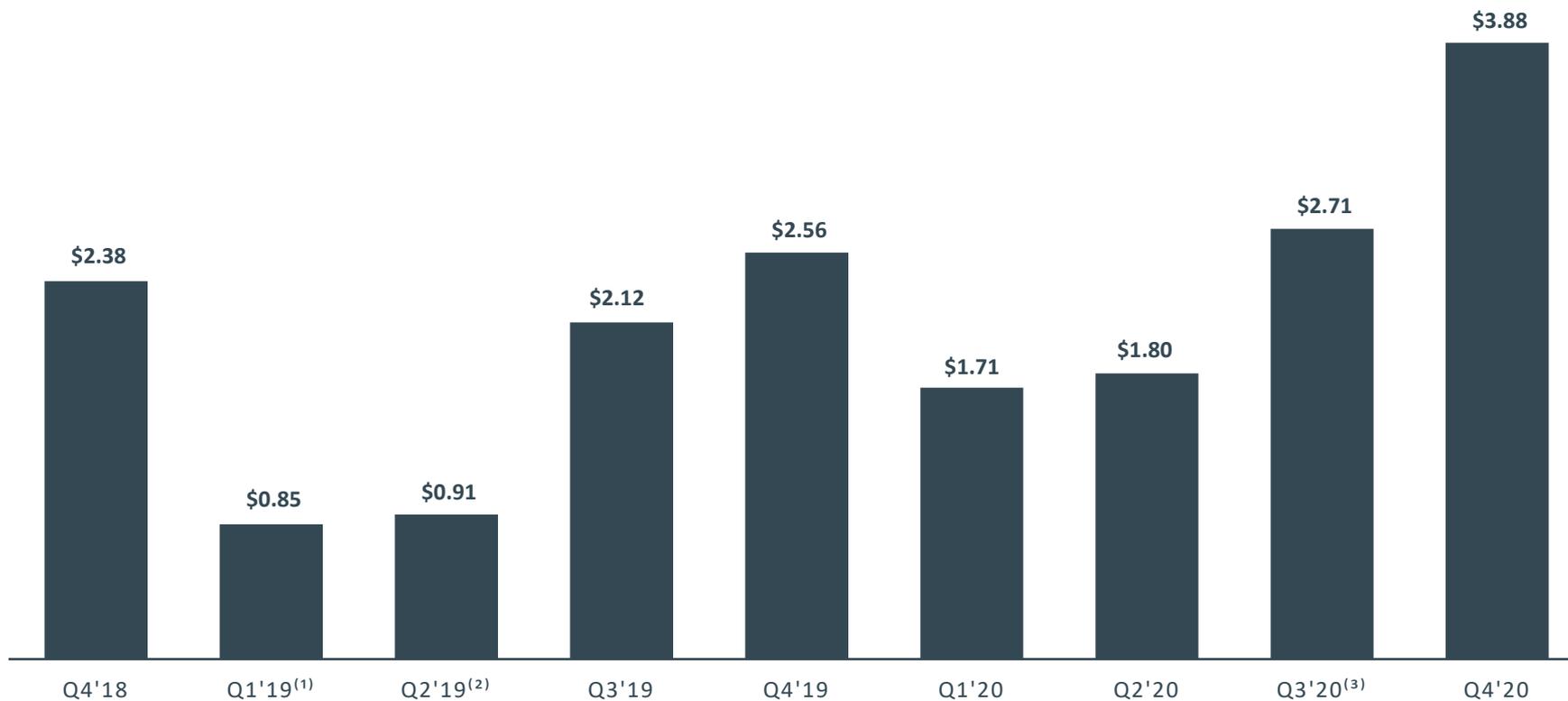
Bar chart of Diluted Earnings Per Share by quarter:

Quarter	EPS
Q4'18	$2.38
Q1'19[1]	$0.85
Q2'19[2]	$0.91
Q3'19	$2.12
Q4'19	$2.56
Q1'20	$1.71
Q2'20	$1.80
Q3'20[3]	$2.71
Q4'20	$3.88

(1) Includes a $3.0 billion legal expense accrued in the first quarter of 2019 related to the FTC matter as discussed in our Q1 2019 Press Release. Excluding this expense, our diluted EPS would have been $1.04 higher.

(2) Includes an additional $2.0 billion legal expense accrued in the second quarter of 2019 related to the FTC settlement and $1.1 billion in income taxes due to the developments in Altera Corp. v. Commissioner as discussed in our Q2 2019 Press Release. Excluding these expenses, our diluted EPS would have been $1.08 higher.

(3) Reflects a one-time income tax benefit of $913 million related to the effects of a tax election to capitalize and amortize certain research and development expenses for U.S. income tax purposes. Excluding this tax benefit, our diluted EPS would have been $0.31 lower.

Capital Expenditures

In Millions

$4,241 — Q4'19
$4,818 — Q4'20
$15,654 — 2019
$15,719 — 2020

Quarterly

Annual
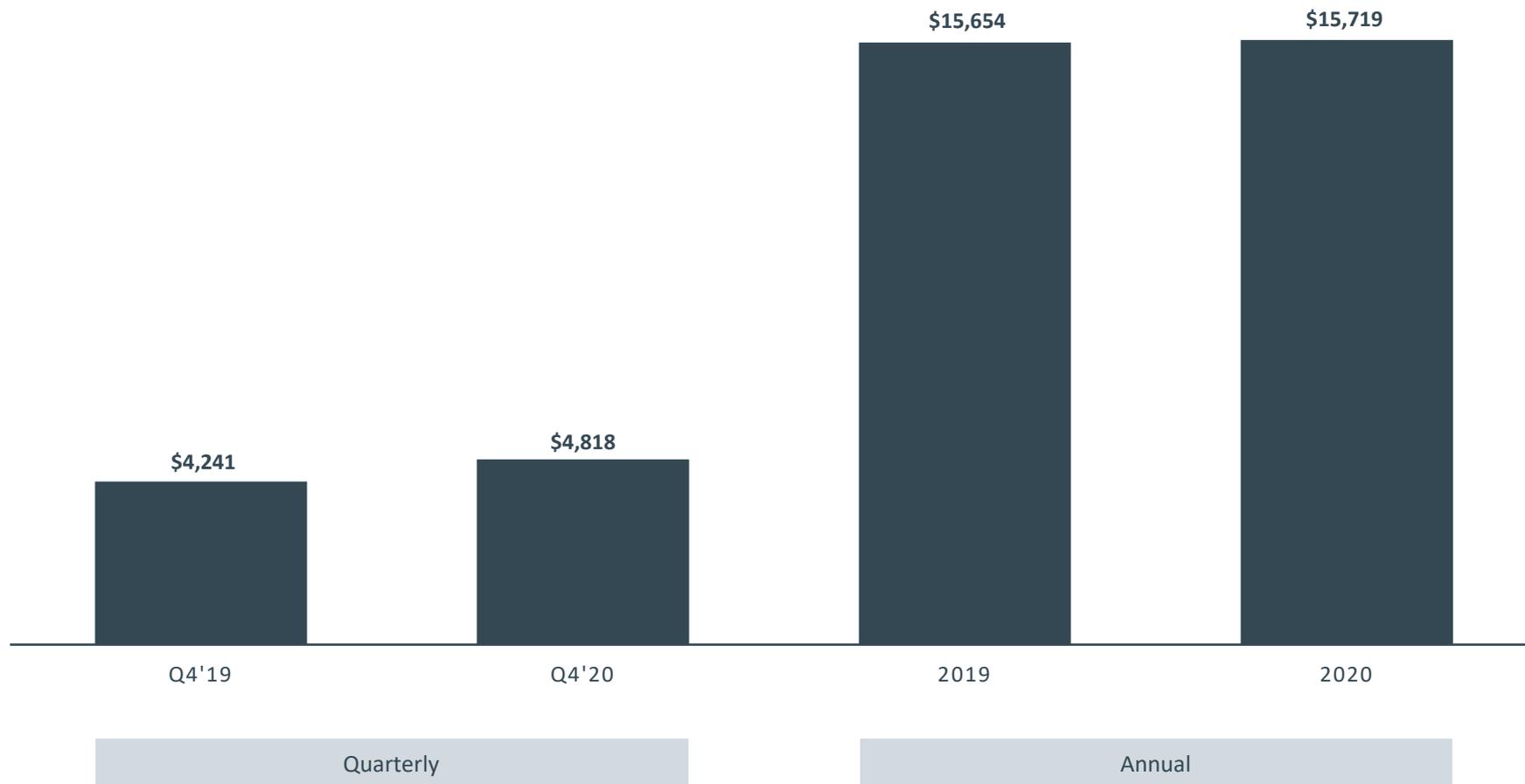
Capital expenditures for periods presented were related to purchases of property and equipment and principal payments on finance leases.

Appendix

Free Cash Flow Reconciliation

In Millions

	Q4'18	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20[1]	Q3'20	Q4'20
Net cash provided by operating activities	$ 7,684	$ 9,308	$ 8,615	$ 9,307	$ 9,083	$ 11,001	$ 3,878	$ 9,828	$ 14,040
Less: Purchases of property and equipment, net	4,366	3,837	3,633	3,532	4,100	3,558	3,255	3,689	4,613
Less: Principal payments on finance leases	-	125	142	144	141	100	109	189	205
Free cash flow	$ 3,318	$ 5,346	$ 4,840	$ 5,631	$ 4,842	$ 7,343	$ 514	$ 5,950	$ 9,222

Free cash flow (FCF) is a non-GAAP financial measure that has limitations as an analytical tool, and you should not consider it in isolation or as a substitute for analysis of other GAAP financial measures, such as net cash provided by operating activities. Some of the limitations of FCF are: (i) FCF does not reflect our future contractual commitments, and (ii) other companies in our industry present similarly titled measures differently than we do, limiting their usefulness as comparative measures. FCF is not intended to represent our residual cash flow available for discretionary expenditures.

(1) Reflects the $5.0 billion FTC settlement that was paid in the second quarter of 2020.

Limitations of Key Metrics and Other Data

The numbers for our key metrics are calculated using internal company data based on the activity of user accounts. We have historically reported the numbers of our daily active users (DAUs), monthly active users (MAUs), and average revenue per user (ARPU) (collectively, our "Facebook metrics") based on user activity only on Facebook and Messenger and not on our other products. Beginning with our fourth quarter 2019 earnings presentation, we also report our estimates of the numbers of our daily active people (DAP), monthly active people (MAP), and average revenue per person (ARPP) (collectively, our "Family metrics") based on the activity of users who visited at least one of Facebook, Instagram, Messenger, and WhatsApp (collectively, our "Family" of products) during the applicable period of measurement. We believe our Family metrics better reflect the size of our community and the fact that many people are using more than one of our products. As a result, over time we intend to report our Family metrics as key metrics in place of DAUs, MAUs, and ARPU.

While these numbers are based on what we believe to be reasonable estimates of our user base for the applicable period of measurement, there are inherent challenges in measuring usage of our products across large online and mobile populations around the world. The methodologies used to measure these metrics require significant judgment and are also susceptible to algorithm or other technical errors. In addition, we are continually seeking to improve our estimates of our user base, and such estimates may change due to improvements or changes in our methodology. We regularly review our processes for calculating these metrics, and from time to time we discover inaccuracies in our metrics or make adjustments to improve their accuracy, which can result in adjustments to our historical metrics. Our ability to recalculate our historical metrics may be impacted by data limitations or other factors that require us to apply different methodologies for such adjustments. We generally do not intend to update previously disclosed Family metrics for any such inaccuracies or adjustments that are within the error margins disclosed below.

In addition, our Facebook metrics and Family metrics estimates will differ from estimates published by third parties due to differences in methodology.

Facebook Metrics

We regularly evaluate our Facebook metrics to estimate the number of "duplicate" and "false" accounts among our MAUs. A duplicate account is one that a user maintains in addition to his or her principal account. We divide "false" accounts into two categories: (1) user-misclassified accounts, where users have created personal profiles for a business, organization, or non-human entity such as a pet (such entities are permitted on Facebook using a Page rather than a personal profile under our terms of service); and (2) violating accounts, which represent user profiles that we believe are intended to be used for purposes that violate our terms of service, such as bots and spam. The estimates of duplicate and false accounts are based on an internal review of a limited sample of accounts, and we apply significant judgment in making this determination. For example, to identify duplicate accounts we use data signals such as identical IP addresses and similar user names, and to identify false accounts we look for names that appear to be fake or other behavior that appears inauthentic to the reviewers. Any loss of access to data signals we use in this process, whether as a result of our own product decisions, actions by third-party browser or mobile platforms, regulatory or legislative requirements, limitations while our personnel work remotely during the COVID-19 pandemic, or other factors, also may impact the stability or accuracy of our estimates of duplicate and false accounts. Our estimates also may change as our methodologies evolve, including through the application of new data signals or technologies or product changes that may allow us to identify previously undetected duplicate or false accounts and may improve our ability to evaluate a broader population of our users. Duplicate and false accounts are very difficult to measure at our scale, and it is possible that the actual number of duplicate and false accounts may vary significantly from our estimates.

In the fourth quarter of 2020, we estimated that duplicate accounts may have represented approximately 11% of our worldwide MAUs. We believe the percentage of duplicate accounts is meaningfully higher in developing markets such as the Philippines and Vietnam, as compared to more developed markets. In the fourth quarter of 2020, we estimated that false accounts may have represented approximately 5% of our worldwide MAUs. Our estimation of false accounts can vary as a result of episodic spikes in the creation of such accounts, which we have seen originate more frequently in specific countries such as Indonesia and Vietnam. From time to time, we disable certain user accounts, make product changes, or take other actions to reduce the number of duplicate or false accounts among our users, which may also reduce our DAU and MAU estimates in a particular period. We intend to disclose our estimates of the number of duplicate and false accounts among our MAUs on an annual basis.

The numbers of DAUs and MAUs discussed in this presentation, as well as ARPU, do not include users on Instagram, WhatsApp, or our other products, unless they would otherwise qualify as DAUs or MAUs, respectively, based on their other activities on Facebook.

Limitations of Key Metrics and Other Data

Family Metrics

Many people in our community have user accounts on more than one of our products, and some people have multiple user accounts within an individual product. Accordingly, for our Family metrics, we do not seek to count the total number of user accounts across our products because we believe that would not reflect the actual size of our community. Rather, our Family metrics represent our estimates of the number of unique people using at least one of Facebook, Instagram, Messenger, and WhatsApp. We do not require people to use a common identifier or link their accounts to use multiple products in our Family, and therefore must seek to attribute multiple user accounts within and across products to individual people. To calculate these metrics, we rely upon complex techniques, algorithms and machine learning models that seek to count the individual people behind user accounts, including by matching multiple user accounts within an individual product and across multiple products when we believe they are attributable to a single person, and counting such group of accounts as one person. These techniques and models require significant judgment, are subject to data and other limitations discussed below, and inherently are subject to statistical variances and uncertainties. We estimate the potential error in our Family metrics primarily based on user survey data, which itself is subject to error as well. While we expect the error margin for our Family metrics to vary from period to period, we estimate that such margin generally will be approximately 4% of our worldwide MAP. At our scale, it is very difficult to attribute multiple user accounts within and across products to individual people, and it is possible that the actual numbers of unique people using our products may vary significantly from our estimates, potentially beyond our estimated error margins. As a result, it is also possible that our Family metrics may indicate changes or trends in user numbers that do not match actual changes or trends.

To calculate our estimates of Family DAP and MAP, we currently use a series of machine learning models that are developed based on internal reviews of limited samples of user accounts and calibrated against user survey data. We apply significant judgment in designing these models and calculating these estimates. For example, to match user accounts within individual products and across multiple products, we use data signals such as similar device information, IP addresses, and user names. We also calibrate our models against data from periodic user surveys of varying sizes and frequency across our products, which are inherently subject to error. The timing and results of such user surveys have in the past contributed, and may in the future contribute, to changes in our reported Family metrics from period to period. In addition, our data limitations may affect our understanding of certain details of our business and increase the risk of error for our Family metrics estimates. Our techniques and models rely on a variety of data signals from different products, and we rely on more limited data signals for some products compared to others. For example, as a result of limited visibility into encrypted products, we have fewer data signals from WhatsApp user accounts and primarily rely on phone numbers and device information to match WhatsApp user accounts with accounts on our other products. Similarly, although Messenger Kids users are included in our Family metrics, we do not seek to match their accounts with accounts on our other applications for purposes of calculating DAP and MAP. Any loss of access to data signals we use in our process for calculating Family metrics, whether as a result of our own product decisions, actions by third-party browser or mobile platforms, regulatory or legislative requirements, limitations while our personnel work remotely during the COVID-19 pandemic, or other factors, also may impact the stability or accuracy of our reported Family metrics. Our estimates of Family metrics also may change as our methodologies evolve, including through the application of new data signals or technologies, product changes, or other improvements in our user surveys, algorithms, or machine learning that may improve our ability to match accounts within and across our products or otherwise evaluate the broad population of our users. In addition, such evolution may allow us to identify previously undetected violating accounts (as defined below).

We regularly evaluate our Family metrics to estimate the percentage of our MAP consisting solely of "violating" accounts. We define "violating" accounts as accounts which we believe are intended to be used for purposes that violate our terms of service, including bots and spam. In the fourth quarter of 2020, we estimated that approximately 3% of our worldwide MAP consisted solely of violating accounts. Such estimation is based on an internal review of a limited sample of accounts, and we apply significant judgment in making this determination. For example, we look for account information and behaviors associated with Facebook and Instagram accounts that appear to be inauthentic to the reviewers, but we have limited visibility into WhatsApp user activity due to encryption. In addition, if we believe an individual person has one or more violating accounts, we do not include such person in our violating accounts estimation as long as we believe they have one account that does not constitute a violating account. From time to time, we disable certain user accounts, make product changes, or take other actions to reduce the number of violating accounts among our users, which may also reduce our DAP and MAP estimates in a particular period. We intend to disclose our estimates of the percentage of our MAP consisting solely of violating accounts on an annual basis. Violating accounts are very difficult to measure at our scale, and it is possible that the actual number of violating accounts may vary significantly from our estimates.

The numbers of Family DAP and MAP discussed in this presentation, as well as ARPP, do not include users on our other products, unless they would otherwise qualify as DAP or MAP, respectively, based on their other activities on our Family products.

Limitations of Key Metrics and Other Data

User Geography

Our data regarding the geographic location of our users is estimated based on a number of factors, such as the user's IP address and self-disclosed location. These factors may not always accurately reflect the user's actual location. For example, a user may appear to be accessing Facebook from the location of the proxy server that the user connects to rather than from the user's actual location. The methodologies used to measure our metrics are also susceptible to algorithm or other technical errors, and our estimates for revenue by user location and revenue by user device are also affected by these factors.

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