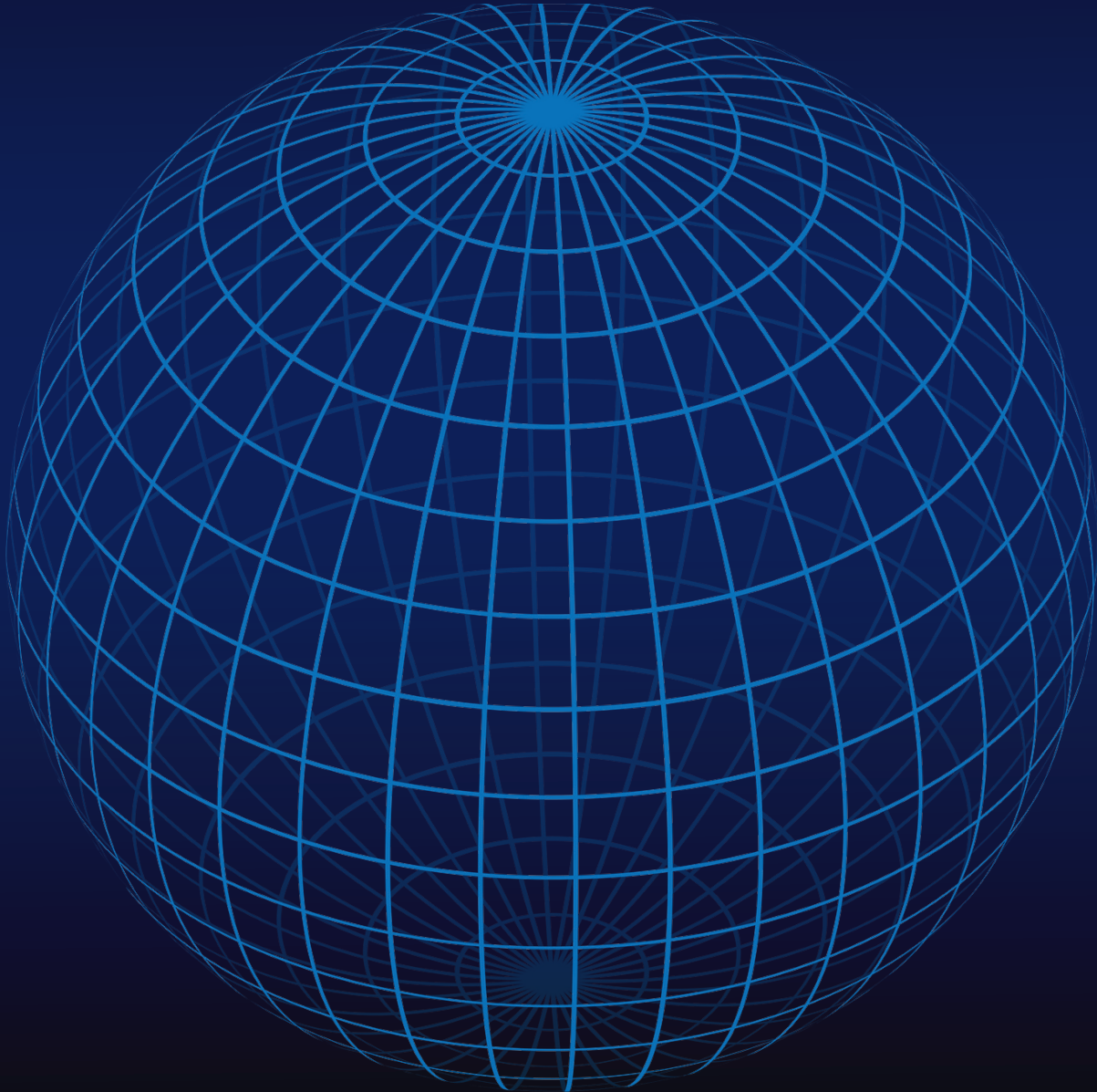


# NET VITALITY 2.0

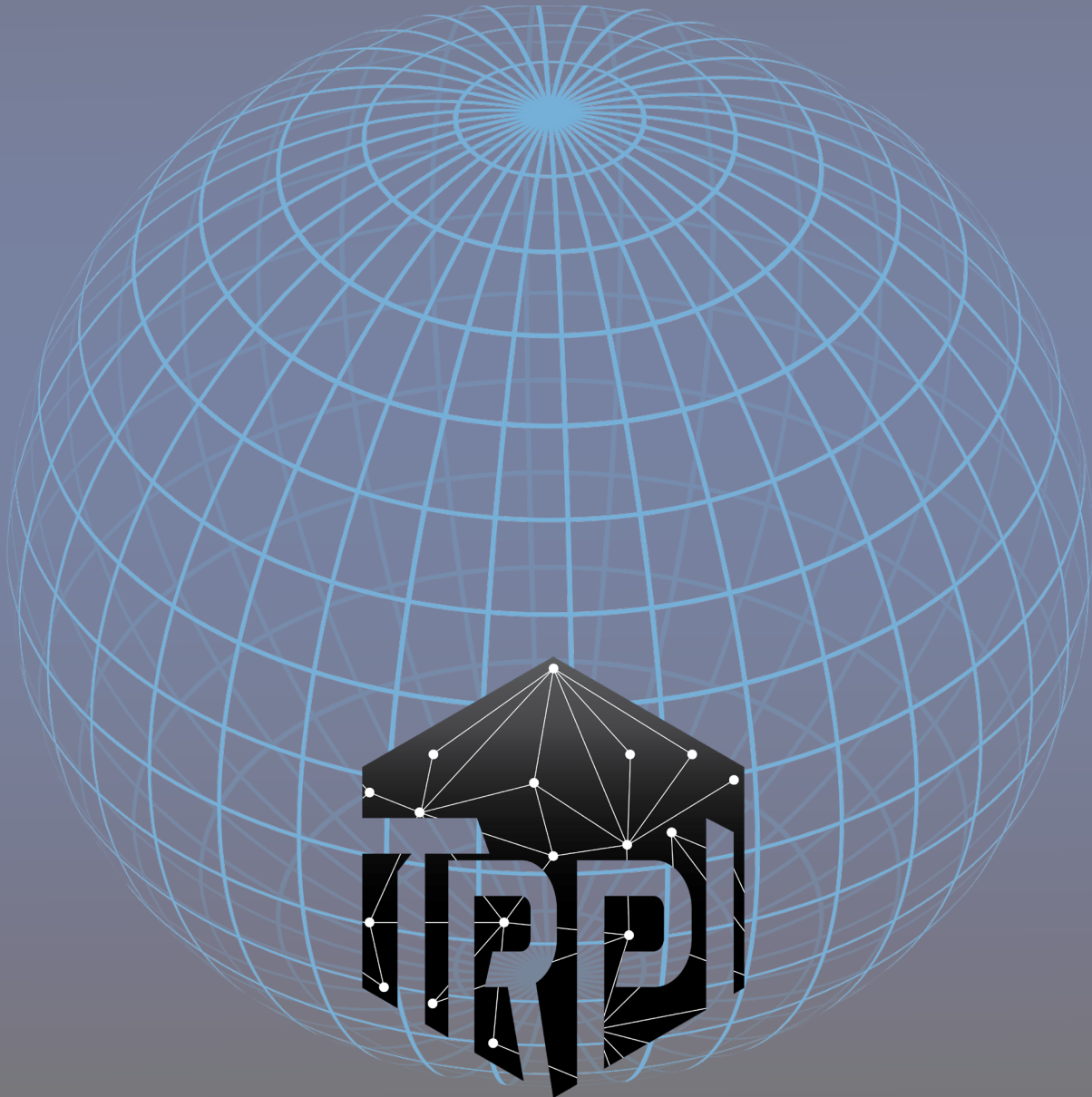
**Identifying the Top-Tier Global  
Broadband Internet Ecosystem Leaders**



**Stuart N. Brotman**

# NET VITALITY 2.0

## Identifying the Top-Tier Global Broadband Internet Ecosystem Leaders



**Telecommunications  
Research and Policy Institute**

**Stuart N. Brotman  
March 2018**

NET VITALITY 2.0  
Identifying the Top-Tier Global  
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# Introduction

In 2015, *Net Vitality: Identifying the Top-Tier Global Broadband Internet Leaders* was released. For the first time, that study focused on the development of a comparative country index that assessed development of the wider broadband Internet ecosystem around the world.

It helped to enrich understanding beyond the narrow perceptions of broadband Internet development in the United States, which lacks a wider context both internally and externally. Such understanding often has been based on dated secondary source material or anecdotal accounts gathered at home and abroad.

In contrast, the initial Net Vitality Index, which is at the core of both the initial version and this updated version 2.0, provides a more holistic view of global broadband Internet development by emphasizing its three interrelated pillars — applications and content, devices, and networks. These pillars comprise an ecosystem that is the basis for our Internet experience, and for the centrality that the Internet now has at work and home.

This wide-angle view is intended to help foster more constructive conversations among government policymakers, the research community, and the public at large. All are stakeholders in sustaining the long-term vibrancy of the Internet — in other words, Net Vitality.

Given the speed of change in the Internet's capabilities, much has transpired since the release of the initial study. Consequently, it is timely to revisit that initial work with this substantially revised study that builds upon the original methodology to assess changes in global broadband Internet ecosystem leadership in the intervening years.

Many of the original sources, however,

could not be used again for a number of reasons. Some were no longer publicly available; others were discontinued or not maintained on at least an annual basis. As a result, the original universe of 52 indices comprising the Net Vitality Index now totals 38 indices. Representation of all three pillars remains intact, however. Additionally, this version 2.0 has expanded the number of indices based on measurements of innovation and competitiveness, in recognition of their continuing linkage between innovation and global broadband Internet ecosystem development. The methodology section of this report (p. 56) provides further details about the selection of indices and the calculation of countries for the Net Vitality Index.

In the initial study, the top-tier global broadband Internet ecosystem leaders were the United States, South Korea, Japan, the United Kingdom, and France. In this version 2.0, three out of the original group of five countries — Japan, France, and South Korea — have been replaced by China, Germany, Canada. In short, in 2018, the five top-tier leaders (grouped in a tier rather than individually ranked) are **China, the United States, Germany, the United Kingdom and Canada** (presented in order of population size).

This movement is important for two reasons. First, it underscores the durable leadership roles that the United States, and the United Kingdom continue to play in global broadband Internet ecosystem development. Second, it suggests that top-tier leadership status is not just a laurel that can be maintained in perpetuity. Rather, peer standing among nations must be pursued continuously, or else top-tier global broadband Internet ecosystem leadership may be diminished over time.

In light of this, governments will utilize regulatory approaches in varying degrees to foster meaningful domestic and international broadband Internet ecosystem growth. But clearly there is no one-size-fits all regulatory regime that can serve as a template for such growth. In contrast, governments continue to have critical roles to play outside the regulatory process – as catalysts and challengers to the private sector.

The countries identified here as top-tier leaders are the ones best positioned to capitalize on favorable attributes they have in place. Geography, demographics, and cultural values

will continue to play important roles, along with regulatory philosophy. And the enduring economic principles of supply, demand, and continuing capital investment also reflect essential elements that those countries in the top-tier leadership rank (or those that aspire to be there) need to keep in sharp focus.

Since there is continuity in some of the themes discussed in the first edition and this revised study, it is useful to revisit key portions from the earlier work. [For ease of reference, these are represented in blue font throughout this report.](#)

# I. A Global View of an Online Moment in Time

Below is an updated snapshot of what the world experiences online—every minute of every day of every week throughout the year. It graphically illustrates how fast Internet time development continues to be, and suggests the common challenge that all countries face: how to ensure a broadband Internet ecosystem with a vibrant digital environment—Net Vitality.

## What Happens Online in 60 Seconds

Action Taken	2014	2015	2016	Two-year increase
Facebook Posts	2.5 million	3.3 million	3.3 million	700,000
Google Searches	2.4 million	3.1 million	3.8 million	1.4 million
Instagram Photos	42,000	55,555	65,972	23,972
Twitter Tweets	347,222	422,340	448,800	101,578
WordPress Posts	972	1,212	1,440	468
WhatsApp Messages	12.5 million	20.8 million	29 million	16.5 million
YouTube Hour of Video Uploaded	300	400	500	200

Year: 2017 • Source: Smart Insights

# II. Applying Analytic Principles of the Competitive Advantage of Nations to the Broadband Internet Ecosystem

As Professor Michael E. Porter of Harvard Business School noted in his seminal Harvard Business Review article, “The Competitive Advantage of Nations” (1990):

“A nation’s competitiveness depends on its industry to innovate and upgrade. In a world of increasingly global competition, nations have become more, not less important. As the basis of competition has shifted more and more to the creation and assimilation of knowledge, the role of the nation has grown.”

Today’s broadband-enabled world — a truly global Internet ecosystem comprised of the intricate relationship among applications and content, devices, and networks — also is a living laboratory for creating the competitive advantage of nations in the 21st century.

The broadband Internet ecosystem of each country depends upon consistent innovation that leads nations to pursue evermore sophisticated sources of competitive advantage.

The attributes that will be presented here in the Net Vitality Index reflect the national environment factors in which companies are born and learn to compete. They also are essential ingredients for achieving international competitive success. Each country must assess the availability of resources and skills necessary for competitive advantage in Internet development and the directions in which they deploy these resources and skills. Perhaps most important are the internal and external pressures on companies to innovate and invest.

Put simply, creating a national environment that creates meaningful incentives for companies to innovate and invest represents the surest pathway to competitive advantage and to the upgrading of these advantages over time. It is the surest pathway to Net Vitality, too.

The benefits of innovation and investment are felt profoundly at home first. As Michael Porter notes: “Nations gain competitive advantage in industries where the composition and character of the home market usually has a disproportionate effect on how companies perceive, interpret, and respond to buyer needs. A nation’s companies gain competitive advantage if domestic buyers are the world’s most sophisticated and demanding buyers for a product or service.” This places the United States in a very favorable position when viewed in a global context that compares national broadband Internet development.

Another major factor supporting national competitive advantage is the presence of related and supporting industries that are nationally competitive. The close working relationship among related and supporting industries in the broadband Internet ecosystem creates these innovation and upgrading advantages. Having devices that take advantage of faster speed broadband networks, or applications that are optimized for new devices, illustrates the leveraging effect that various parts of the broadband Internet ecosystem have on each other. These relationships shorten lines of communication, enhance the constant flow of information, and promote an ongoing exchange of ideas and innovations. In other words, evaluating broadband Internet ecosystems based on robustness is a useful way to determine a country’s standing as a top-tier global broadband leader.



# III. Developing the Net Vitality Index

Much of recent scholarly research in the field of broadband development has taken a limited approach to analyzing the broadband Internet ecosystem, such as by focusing on several performance metrics that represent only one of its important aspects — broadband networks (and often even more narrowly, on fixed broadband networks for residential users). Comparisons of fixed broadband deployment to these users (although not including actual adoption data), broadband network speeds (whether actual or merely advertised), and broadband pricing (regardless of discounts that may be offered through bundling of telephony and video services into a “triple play”) have been advanced by some policy advocates as the critical points of comparison to evaluate broadband Internet development. Based on these analyses, the policy discussion in the United States and many other countries around the world has become too narrowly focused on raising these metrics nationally.

This comparative analytic approach is flawed at many levels. First, although it might compare countries, which is the most useful unit of analysis, it often does so by mixing and matching data that measure different things (actual vs. advertised broadband network speeds, for example).

This can skew upward the perception that some countries are substantially outperforming other countries. The time frames for these comparisons also may reflect data that are five or more years old — a generation ago in Internet time.

Comparisons of this type also typically result in numerical rankings, which is a popular yet deceptive way to illustrate how far ahead or far behind a particular country might be in

broadband network development on a global comparative basis.

Meaningful distinctions among countries with virtually comparable broadband network metrics also are difficult to assess solely through a numerical ranking system.

Other analytic approaches, to their credit, have reflected a fuller set of measures that capture a more complete and accurate picture of the broadband Internet ecosystem. But virtually all of them usually don’t compare countries on an “apples-to-apples” basis. Instead, the comparative lens creates a softer focus on regions, with the United States and European Union (EU) often articulated as the points of comparison (even though, as a threshold matter, one represents a single nation and the other is a regional alliance representing 28 individual nations).

So the task in this study has been to assemble more timely, reliable, and comprehensive data reflecting the broadband Internet ecosystem, along with relevant macroeconomic forces that help shape it. It represents the first ever quantitative and qualitative composite analysis of broadband development that utilizes country comparisons of the entire broadband Internet ecosystem.

All data utilized in developing the Net Vitality Index were published on a nonproprietary basis within the past five years. Whenever possible, the most recent version of a particular index was used rather than an older predecessor. **The sources chosen were those with a high degree of global recognition; these include: Freedom House, International Telecommunication Union, United Nations, World Economic Forum, and World Wide Web Foundation.**

Net Vitality 2.0 reflects a new top tier of global broadband Internet ecosystem leaders --

**China, the United States, Germany, the United Kingdom and Canada.** These countries are not presented in rank order, however, since this has not been established. Additionally, given that some countries may not achieve a ranking in a particular index, the end result is not intended to represent a precise mathematical calculation that itself may be reduced to yet another numerical ranking.

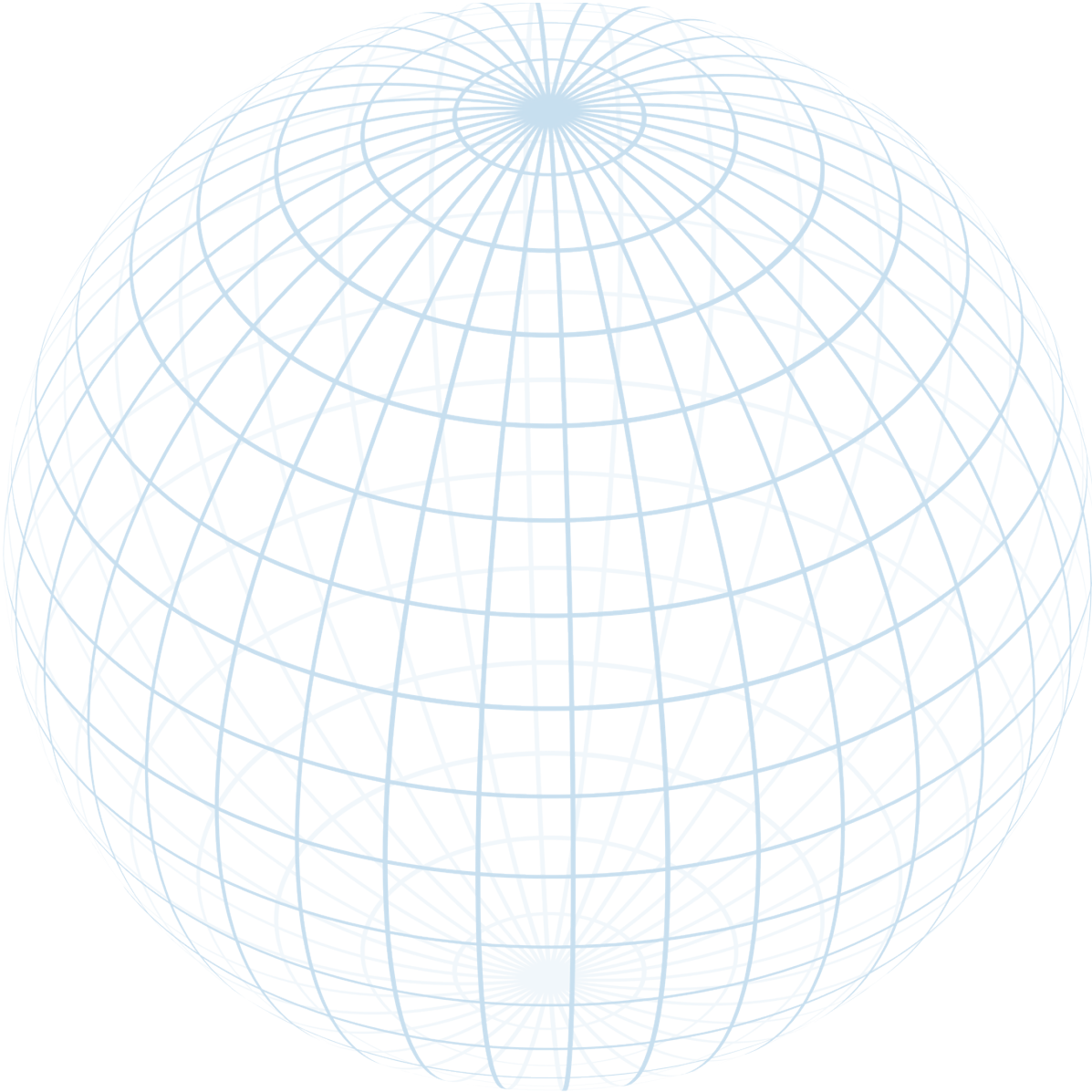
Japan, France, and South Korea all formerly held positions among the top tier in the first Net Vitality Index. With this updated report, they have each been edged out, but remain strong contenders overall. Although they are equally strong in indices pertaining to broadband networks, and applications and content, they fell behind the new top-tier countries where indicators of broadband innovation and global competitiveness are concerned. Additionally, of these three countries, only South Korea appears in the indices pertaining to broadband devices, and this only occurs once.

Japan, France, and South Korea are not the only countries that may land in the top tier in a future report; Australia and Singapore both are potentially within reach, as well. An increase in innovation and competitiveness factors may well put them among the top tier in the foreseeable future.

Further segmentation into lower tiers of all countries would be useful over time. This study's available resources, including necessary sets of timely and reliable data, were not available to complete such a comprehensive task. Future iterations of the Net Vitality Index may produce other tiers that then can be compared to each other, which can yield additional insights.

The development of appropriate tools by policymakers that are focused on how their respective countries over time will maintain or aspire to the leadership level of these top-tier global broadband Internet countries would be beneficial, as well.

# IV. The Net Vitality Index in Brief





# Broadband Applications and Content

## eCommerce Related Accounts

1



Norway

1



Sweden

1



New Zealand

1



Finland

1



Denmark

6



Netherlands

6



United Kingdom

6



Germany

6



Iceland

6



Australia

6



Canada

20



China (Hong Kong)

25



United States

*Numbered box in gray denotes a tie*

Year: 2016 • Source: United Nations Conference on Trade and Development • # of Countries: 143

## Top Economies: Total B2B and B2C eCcommerce in Dollars

-  **United States**
-  **Japan**
-  **China**
-  **South Korea**
-  **Germany**
-  **United Kingdom**
-  **France**
-  **Canada**
-  **Spain**
-  **Australia**

Year: 2016 • Source: United Nations Conference on Trade and Development • # of Countries: 10

## Overall Access to Online Information

1		Denmark
2		Iceland
3		South Korea
4		Singapore
5		Netherlands
6		Finland
7		Norway
8		New Zealand
9		Belgium
10		Ireland
<hr/>		
14		United Kingdom
15		Germany
18		Japan
21		United States
36		China

Year: 2015 • Source: World Wide Web Foundation • # of Countries: 86

# Access To Information: Education and Awareness

- 1  Qatar
- 2  Singapore
- 3  Iceland
- 4  Denmark
- 5  New Zealand
- 6  Estonia
- 7  Spain
- 8  Australia
- 9  Norway
- 10 
- 21  United States
- 28  Japan
- 29  United Kingdom
- 30  Germany
- 39  China

Year: 2015 • Source: World Wide Web Foundation • # of Countries: 86



## Lowest Obstacles to Internet Access

1



Estonia

2



Iceland

3



Australia

3



Canada

3



United Kingdom

6



France

6



Germany

6



South Korea

9



United States

9



Hungary

9



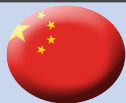
Italy

13



Japan

53



China

*Numbered box in gray denotes a tie*

Year: 2017 • Source: Freedom House • # of Countries: 65

## Fewest Limits on Internet Content

1		Iceland
2		Estonia
3		Canada
3		United States
5		United Kingdom
6		Australia
6		Germany
6		Italy
6		Georgia
6		South Africa
6		Philippines
63		China

*Numbered box in gray denotes a tie*

Year: 2017 • Source: Freedom House • # of Countries: 65

# Fewest Violations of Internet User Rights

1		Estonia
2		Iceland
3		Canada
4		Germany
4		Georgia
4		South Africa
7		Japan
8		Australia
8		Philippines
10		United States
10		Hungary
10		Argentina
19		United Kingdom
64		China

*Numbered box in gray denotes a tie*

Year: 2017 • Source: Freedom House • # of Countries: 65

## eGovernment Utilization

1  United Kingdom

2  Australia

3  South Korea

4  Singapore

5  Finland


6  Sweden

7  Netherlands

8  New Zealand

9  Denmark

10  France

12  United States

14  Canada

15  Germany

63  China

Year: 2016 • Source: United Nations • # of Countries: 193

# eGovernment Participation

**1**  United Kingdom

**2**  Japan

**2**  Australia

**4**  South Korea

**5**  Netherlands

**5**  New Zealand

**7**  Spain


**8**  Singapore

**8**  Canada

**8**  Italy

**8**  Finland

**12**  United States

**22**  China

**25**  Germany

*Numbered box in gray denotes a tie*

Year: 2016 • Source: United Nations • # of Countries: 193

# Internet Usage by Population

1		Iceland
2		Luxembourg
2		Norway
2		Denmark
5		United Kingdom
6		South Korea
7		Sweden
7		Japan
9		United Arab Emirates
10		Netherlands
10		Germany
10		Canada
17		China
18		United States

*Numbered box in gray denotes a tie*

Year: 2016 • Source: United Nations Conference on Trade and Development • # of Countries: 143

# Social Media Penetration by Population

1  United Arab Emirates

2  South Korea

3  Singapore

4  China (Hong Kong)

5  Malaysia

6  Argentina

7  Thailand

8  United States

9  Australia

10  United Kingdom

11  Canada

23  Germany

Year: 2017 • Sources: We Are Social, Hootsuite • # of Countries: 28

## Intensity of Social Media Usage

1		Iceland
2		Norway
3		United States
4		Netherlands
5		United Kingdom
6		United Arab Emirates
7		Sweden
8		Singapore
9		Lithuania
10		Finland
<hr/>		
18		Canada
52		Germany
107		China

Year: 2016 • Sources: INSEAD, The Adecco Group, Human Capital Leadership Institute • # of Countries: 118



# Information and Communication Technologies Development

-  Luxembourg
  -  Iceland
  -  United Kingdom
  -  Germany
  -  Switzerland
  -  Malta
  -  Netherlands
  -  South Korea
  -  Sweden
  -  Japan
- 
-  Canada
  -  United States
  -  China

Year: 2016 • Sources: INSEAD, The Adecco Group, Human Capital Leadership Institute • # of Countries: 118













# Broadband Devices

# Top Personal Computer Operating Systems

1		United States	Microsoft Windows 7
2		United States	Apple iOS 9
3		United States	Google Android 4
4		United States	Google Android 5
5		United States	Microsoft Windows 10
6		United States	Microsoft Windows 8.1
7		United States	Google Android 6
8		United States	Apple Mac OS X
9		United States	Apple iOS 10
10		United States	Microsoft Windows XP





Year: 2016 • Source: W3counter • # of Countries: 1

## Top Web Browsers

1		United States	Apple Safari 7
2		United States	Google Chrome 51
3		United States	Google Chrome 49
4		United States	Microsoft Internet Explorer 11
5		United States	Google Chrome 54
6		United States	Google Chrome 50
7		United States	Google Chrome 52
8		United States	Google Chrome 48
9		United States	Google Chrome 53
10		United States	Google Chrome 47

Year: 2016 • Source: W3counter • # of Countries: 1

# Global Smartphone Sales to End Users by Operating System

1		United States	Google Android
2		United States	Apple iOS
3		United States	Microsoft Windows Mobile
4		Canada	Blackberry OS

Year: 2016 • Source: Gartner • # of Countries: 2

# Global Smartphone Sales to End Users by Volume

1		South Korea	Samsung
2		United States	Apple
3		China	Huawei
4		China	Oppo
5		China	Vivo

Year: 2016 • Source: Gartner • # of Countries: 3



# Broadband Networks

# Broadband Communications Infrastructure

- 1  South Korea
  - 2  Denmark
  - 3  Ireland
  - 4  Iceland
  - 5  Netherlands
  - 6  Belgium
  - 7  New Zealand
  - 8  Switzerland
  - 9  Singapore
  - 10  United Kingdom
- 
- 12  Germany
  - 18  United States
  - 19  Canada
  - 44  China

Year: 2015 • Source: World Wide Web Foundation • # of Countries: 86



## Broadband Access and Affordability

1



South Korea

2



Denmark

3



Finland

4



Estonia

5



Norway

6



Iceland

7



United Kingdom

8



Sweden

9



Singapore

10



Netherlands

14



Germany

18



United States

20



Canada

38



China

Year: 2015 • Source: World Wide Web Foundation • # of Countries: 86

# Broadband Network Expansion Capability

- 1  Singapore
- 2  Finland
- 3  Sweden
- 4  Norway
- 5  United States
- 6  Netherlands
- 7  Switzerland
- 8  United Kingdom
- 9  Luxembourg
- 10 
- 12  China (Hong Kong)
- 14  Canada
- 15  Germany

Year: 2016 • Source: International Telecommunication Union • # of Countries: 137

# Average Fixed Broadband Connection Speed

1		South Korea
2		Norway
3		Sweden
4		China
5		Switzerland
6		Finland
7		Japan
8		Singapore
9		Denmark
10		Latvia
10		Netherlands
13		United States
17		United Kingdom
23		Canada
24		Germany

*Numbered box in gray denotes a tie*

Year: 2016 • Source: Akamai • # of Countries: 72

# Percentage of Population with Fixed Broadband Connection Speeds Above 10 Mbps

1		South Korea
2		Singapore
3		Switzerland
3		Japan
5		China (Hong Kong)
6		Netherlands
7		Belgium
8		Norway
9		Bulgaria
10		Romania
15		United States
17		United Kingdom
20		Canada
22		Germany

*Numbered box in gray denotes a tie*





Year: 2016 • Source: Akamai • # of Countries: 72

# Fixed Broadband Subscriptions per 100 Inhabitants

1		Monaco
2		Switzerland
3		Denmark
4		France
5		Liechtenstein
6		Netherlands
7		South Korea
8		Norway
9		Andorra
10		Malta
<hr/>		
11		United Kingdom
12		Germany
16		Canada
19		China
24		United States

Year: 2017 • Sources: Broadband Commission for Sustainable Development, International Telecommunication Union, United Nations Educational, Scientific and Cultural Organization • # of Countries: 62

# Mobile Broadband Subscriptions per 100 Inhabitants

1		China (Macao)
2		Bahrain
3		United Arab Emirates
4		Finland
5		Liechtenstein
6		Singapore
7		Japan
8		Australia
9		Qatar
10		Sweden
<hr/>		
13		United States
30		United Kingdom
42		Germany
68		Canada

Year: 2017 • Source: Institute for Management Development World Competitiveness Center • # of Countries: 62

# Unique IPv4 Addresses

- 1  United States
- 2  China
- 3  Brazil
- 4  Japan
- 5  Germany
- 6  United Kingdom
- 7  France
- 8  South Korea
- 9  Russia
- 10  India
- 13  Canada

Year: 2016 • Source: Akamai • # of Countries: 72

# IPv6 Adoption

1		Belgium
2		United States
3		India
4		Greece
5		Germany
6		Luxembourg
7		Switzerland
8		Finland
9		Brazil
10		Canada
<hr/>		
17		United Kingdom
67		China

Year: 2017 • Source: Akamai • # of Countries: 74



## Least Inherent Cyber Risk

-  Benin
  -  Mongolia
  -  Senegal
  -  Namibia
  -  Ghana
  -  Botswana
  -  Madagascar
  -  Nicaragua
  -  Tanzania
  -  Mozambique
- 
-  United States
  -  Germany
  -  Canada
  -  United Kingdom
  -  China

Year: 2017 • Source: FM Global • # of Countries: 124

## Secure Internet Servers

1



Switzerland

1



Iceland

3



Netherlands

4



Luxembourg

5



Norway

5



South Korea

7



Malta

8



Sweden

8



Finland

8



Denmark

11



Germany

11



United States

14



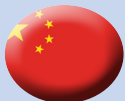
United Kingdom

16



Canada

22



China

*Numbered box in gray denotes a tie*

Year: 2016 • Source: United Nations Conference on Trade and Development • # of Countries: 143




# Broadband Innovation and Competitiveness Indicators

# Global Innovation

- 1  Switzerland
- 2  Sweden
- 3  Netherlands
- 4  **United States**
- 5  **United Kingdom**
- 5  Denmark
- 7  Singapore
- 8  Finland
- 9  **Germany**
- 10  Ireland
- 16  **China**
- 18  **Canada**

Year: 2017 • Sources: Cornell University, INSEAD, World Intellectual Property Organization • # of Countries: 126

# Overall Global Competitiveness

- 1  Switzerland
- 2  United States
- 3  Singapore
- 4  Netherlands
- 5  Germany
- 5  China (Hong Kong)
- 7  Sweden
- 8  United Kingdom
- 9  Japan
- 10  Finland
- 14  Canada


Year: 2016 • Source: World Economic Forum • # of Countries: 134

# Global Competitiveness: Technological Efficiency

- 1  United States
- 2  Singapore
- 3  Switzerland
- 4  China
- 5  United Kingdom
- 6  Germany
- 7  Canada
- 8  Netherlands
- 9  New Zealand
- 10  Japan

Year: 2017 • Source: World Economic Forum • # of Countries: 134

# Global Competitiveness: Innovation and Sophistication

1		Switzerland
2		United States
3		Germany
3		Netherlands
3		Sweden
3		Japan
7		Israel
7		Finland
9		United Kingdom
9		Austria
9		Denmark
15		China (Hong Kong)
24		Canada

*Numbered box in gray denotes a tie*

Year: 2017 • Source: World Economic Forum • # of Countries: 134

## Leading Global Innovation Cities

1		United States	New York City
2		United Kingdom	London
3		France	Paris
4		Japan	Tokyo
5		China	Hong Kong
6		Singapore	Singapore
7		United States	Chicago
8		United States	Los Angeles
9		China	Beijing
10		United States	Washington, D.C.
<hr/>			
14		Germany	Berlin
16		Canada	Toronto

Year: 2017 • Source: A.T. Kearney • # of Countries: 16



## Leading Cities for Startup Companies

1		United States	Silicon Valley (Region)
2		United States	New York City
3		United Kingdom	London
4		China	Beijing
5		United States	Boston
6		Israel	Tel Aviv
7		Germany	Berlin
8		China	Shanghai
9		United States	Los Angeles
10		United States	Seattle
15		Canada	Vancouver

Year: 2017 • Source: Startup Genome • # of Countries: 12

## Internet Market Attractiveness

- 1  United States
- 2  China
- 3  United Kingdom
- 4  Japan
- 5  Germany
- 6  France
- 7  South Korea
- 8  Russia
- 9  Belgium
- 10  Australia
- 11  Canada




Year: 2016 • Source: A.T. Kearney • # of Countries: 29

## Highest Market Value Internet Companies

1		United States	Apple
2		United States	Alphabet/Google
3		United States	Amazon
4		United States	Facebook
5		China	Tencent
6		China	Alibaba
7		United States	Priceline
8		United States	Netflix
9		United States	Uber
10		China	Baidu

Year: 2017 • Source: Ecommerce Foundation • # of Countries: 2

## Largest eCommerce Companies

1		United States	Amazon
2		China	Alibaba
3		United States	eBay
4		Japan	Rakuten
5		Germany	Zalando
6		United States	Groupon
7		India	Flipkart
8		United Kingdom	Asos.com

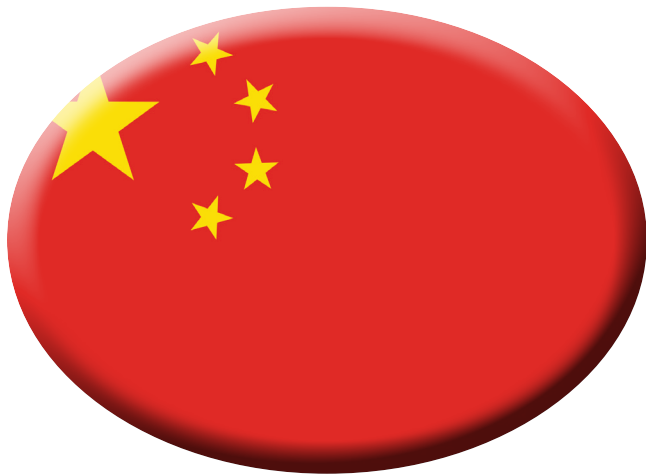
Year: 2017 • Source: Ecommerce Foundation • # of Countries: 2

# Favorable eCommerce Regulatory Framework

- 1  Singapore
- 2  Finland
- 3  Norway
- 4  Sweden
- 5  United Arab Emirates
- 6  China (Hong Kong)
- 7  New Zealand
- 8  Denmark
- 9  Netherlands
- 10  Luxembourg
- 12  United Kingdom
- 17  United States
- 20  Germany
- 21  Canada

Year: 2017 • Source: Institute for Management Development World Competitiveness Center • # of Countries: 63

# V. Summary: The Top-Tier Global Broadband Ecosystem Leaders



# China



<i>Index</i>	<i>Rank</i>
eCommerce Related Accounts	20
Top Economies: Total B2B and B2C eCommerce in Dollars	3
Overall Access to Information	36
Access to Information: Education and Awareness	39
Lowest Obstacles to Internet Access	53
Fewest Limits on Internet Content	63
Fewest Violations of Internet User Rights	64
eGovernment Utilization	63
eGovernment Participation	22
Internet Usage by Population	17
Social Media Penetration by Population	4
Intensity of Social Media Usage	107
Information and Communication Technologies Development	74
Global Smartphone Sales to End Users by Volume	3
Broadband Communications Infrastructure	44
Broadband Access and Affordability	38
Broadband Network Expansion Capability	12
Average Fixed Broadband Connection Speed	4
Percentage of Population with Fixed Broadband Connection Speed Above 10 Mbps	5
Fixed Broadband Subscriptions per 100 Inhabitants	19
Mobile Broadband Subscriptions per 100 Inhabitants	1
Unique IPv4 Addresses	2
IPv6 Adoption	67
Least Inherent Cyber Risk	110
Secure Internet Servers	22
Global Innovation	16
Overall Global Competitiveness	6
Global Competitiveness: Technological Efficiency	4
Global Competitiveness: Innovation and Sophistication	15
Leading Global Innovation Cities	5
Internet Market Attractiveness	2
Most Valuable Internet Companies	5
Leading Cities for Startup Companies	4
Highest Market Value Internet Companies	5
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# United States



<i>Index</i>	<i>Rank</i>
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Top Economies: Total B2B and B2C eCommerce in Dollars	1
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Lowest Obstacles to Internet Access	6
Access to Information: Education and Awareness	21
Fewest Limits on Internet Content	3
Fewest Violations of Internet User Rights	10
eGovernment Utilization	12
eGovernment Participation	12
Internet Usage by Population	18
Social Media Penetration by Population	8
Intensity of Social Media Usage	3
Information and Communication Technologies Development	27
Top Personal Computer Operating Systems	1
Top Web Browsers	1
Global Smartphone Sales To End Users by Operating System	1
Global Smartphone Sales to End Users by Volume	2
Broadband Communications Infrastructure	18
Broadband Access and Affordability	18
Broadband Network Expansion Capability	5
Average Fixed Broadband Connection Speed	13
Percentage of Population with Fixed Broadband Connection Speed Above 10 Mbps	15
Fixed Broadband Subscriptions per 100 Inhabitants	24
Mobile Broadband Subscriptions per 100 Inhabitants	13
Unique IPv4 Addresses	1
IPv6 Adoption	2
Least Inherent Cyber Risk	41
Secure Internet Servers	11
Global Innovation	4
Overall Global Competitiveness	2
Global Competitiveness: Technological Efficiency	1
Global Competitiveness: Innovation and Sophistication	2
Leading Global Innovation Cities	1
Leading Cities for Startup Companies	1
Internet Market Attractiveness	1
Favorable eCommerce Regulatory Framework	1
Largest eCommerce Companies	1
Favorable eCommerce Regulatory Framework	17



# Germany



<i>Index</i>	<i>Rank</i>
eCommerce Related Accounts	6
Top Economies: Total B2B and B2C eCommerce in Dollars	5
Overall Access to Information	15
Access to Information: Education and Awareness	30
Lowest Obstacles to Internet Access	6
Fewest Limits on Internet Content	6
Fewest Violations of Internet User Rights	4
eGovernment Utilization	15
eGovernment Participation	25
Internet Usage by Population	10
Social Media Penetration by Population	23
Intensity of Social Media Usage	52
Information and Communication Technologies Development	4
Broadband Communications Infrastructure	12
Broadband Access and Affordability	14
Broadband Network Expansion Capability	15
Average Fixed Broadband Connection Speed	24
Percentage of Population with Fixed Broadband Connection Speed Above 10 Mbps	22
Fixed Broadband Subscriptions per 100 Inhabitants	12
Mobile Broadband Subscriptions per 100 Inhabitants	42
Unique IPv4 Addresses	5
IPv6 Adoption	5
Least Inherent Cyber Risk	72
Secure Internet Servers	11
Global Innovation	9
Overall Global Competitiveness	5
Global Competitiveness: Technological Efficiency	6
Global Competitiveness: Innovation and Sophistication	3
Leading Global Innovation Cities	14
Leading Cities for Startup Companies	7
Internet Market Attractiveness	5
Largest eCommerce Companies	5
Favorable eCommerce Regulatory Framework	20

# United Kingdom



<i>Index</i>	<i>Rank</i>
eCommerce Related Accounts	6
Top Economies: Total B2B and B2C eCommerce in Dollars	6
Overall Access to Information	14
Access to Information: Education and Awareness	29
Lowest Obstacles to Internet Access	3
Fewest Limits on Internet Content	5
Fewest Violations of Internet User Rights	19
eGovernment Utilization	1
eGovernment Participation	1
Internet Usage by Population	5
Social Media Penetration by Population	5
Intensity of Social Media Usage	10
Information and Communication Technologies Development	3
Broadband Communications Infrastructure	10
Broadband Access and Affordability	7
Broadband Network Expansion Capability	8
Average Fixed Broadband Connection Speed	17
Percentage of Population with Fixed Broadband Connection Speed Above 10 Mbps	17
Fixed Broadband Subscriptions per 100 Inhabitants	11
Mobile Broadband Subscriptions per 100 Inhabitants	30
Unique IPv4 Addresses	6
IPv6 Adoption	17
Least Inherent Cyber Risk	82
Secure Internet Servers	14
Global Innovation	5
Overall Global Competitiveness	8
Global Competitiveness: Technological Efficiency	5
Global Competitiveness: Innovation and Sophistication	9
Leading Global Innovation Cities	2
Leading Cities for Startup Companies	3
Internet Market Attractiveness	3
Largest eCommerce Companies	8
Favorable eCommerce Regulatory Framework	12

# Canada



<i>Index</i>	<i>Rank</i>
eCommerce Related Accounts	6
Top Economies: Total B2B and B2C eCommerce in Dollars	8
Overall Access to Information	19
Access to Information: Education and Awareness	13
Lowest Obstacles to Internet Access	4
Fewest Limits on Internet Content	3
Fewest Violations of Internet User Rights	3
eGovernment Utilization	14
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Internet Usage by Population	12
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Broadband Network Expansion Capability	14
Average Fixed Broadband Connection Speed	23
Percentage of Population with Fixed Broadband Connection Speed Above 10 Mbps	20
Fixed Broadband Subscriptions per 100 Inhabitants	16
Mobile Broadband Subscriptions per 100 Inhabitants	68
Unique IPv4 Addresses	13
IPv6 Adoption	10
Least Inherent Cyber Risk	77
Secure Internet Servers	16
Global Innovation	18
Overall Global Competitiveness	14
Global Competitiveness: Technological Efficiency	7
Global Competitiveness: Innovation and Sophistication	24
Leading Global Innovation Cities	16
Leading Cities for Startup Companies	15
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Favorable eCommerce Regulatory Framework	21

# Methodology Summary

The Net Vitality Index (NVI) is a measure of inclusion by high reputation organizations in Internet policy and economics. Index components were selected based upon their historical reputation and contribution to Internet affairs. Using basic content analysis, countries received a single point if they were recognized in an NVI contributing component variable. The method acknowledges the possibility of some countries receiving multiple mentions in some lists that would convey a sense of magnitude.

Country or country affiliation is attributable in all components. Some components, however, allow for countries to be mentioned only a single time (i.e., where the variable is the country), while others allow for multiple mentions (e.g., home country of top operating systems), creating the potential for unintended weighting. Therefore, magnitude is acknowledged but not captured by the index.

The component scores were then tallied on a country-by-country basis, with the top five countries by tally identified as top-tier broadband Internet ecosystem leaders. It also should be noted that while some individual index

components may be influenced by geographic or population size, this does not seem to be a significant factor in the overall analysis.

Due to variation in the component data sources, the NVI used United Nations state member nations as a master list, resulting in some omissions, as in the cases of Taiwan and Libya, and merging as occurred with Hong Kong and China.

Some component variables originate from the same organization and in some cases represent the same selection of countries. Moreover, the four categories are not equally weighted, which reflects the author's expert judgment regarding the importance of these factors contributing to overall Net Vitality. Subsequent research based on this initial Net Vitality Index may reflect different weighting of the four categories or different weighting of individual indices. It also may reflect updated data and additional indices, as well as other analytic methods for determining a full range of leadership tier levels. These possibilities suggest that rich research avenues can and should be explored on a regular basis.

# About the Author

Stuart N. Brotman is an American government policymaker; tenured university professor; management consultant; lawyer; author and editorial adviser; and non-profit organization executive. He has served in four Presidential Administrations on a bipartisan basis and has taught students from 42 countries in six separate disciplines--communications, journalism, business, law, international relations and public policy.

Brotman is the inaugural Howard Distinguished Endowed Professor of Media Management and Law and Beaman Professor of Communication and Information at the University of Tennessee, Knoxville.

He also is an honorary adjunct professor at the Jindal Global Law School in India and an affiliated researcher at the Media Management Transformation Centre of the Jönköping International Business School in Sweden. He is an appointed arbitrator and mediator at the World Intellectual Property Organization in Geneva, Switzerland.

He served two terms as an appointed member of the US Department of State Advisory Committee on International Communications and Information Policy (ACICIP), serving in an advisory capacity concerning major economic, social and legal issues and problems in international communications and information policy.

Brotman served as the Fulbright-Nokia Distinguished Chair in Information and Communications Technologies in the Faculty of Social Sciences, Department of Social Research/Media and Communication Studies, at the University of Helsinki.

He also has served as founder and president of two successful global management consulting firms serving the telecommunications, Internet, media, entertainment and sports industries, with client engagements in over 30 countries in North America, Latin America, Europe and Asia.

Brotman served as Special Assistant to the President's principal communications policy adviser and Chief of Staff at the National Telecommunications and Information Administration (NTIA) in Washington, DC.

He was the first Harvard Law School faculty member to teach telecommunications law and its first Visiting Professor of Entertainment and Media Law. He also has served as a faculty member in Harvard Law School's Institute for Global Law and Policy, and in the Harvard Business School Executive Education Program.

He held the first concurrent appointment in digital media at Harvard and MIT, respectively at the Berkman Center for Internet & Society and the Program on Comparative Media Studies. Brotman also serves as an annual visiting lecturer in Entertainment and Media Law at Stanford Law School.

Brotman is the only two-time recipient of Lifetime Achievement Awards from the Broadcast Education Association-- in Law and Policy (2014) and in Scholarship (2016).

He is the editor of *The Telecommunications Deregulation Sourcebook*, a reference volume covering the broadcasting, cable television and telephone industries; *Telephone Company and Cable Television Competition*, an anthology dealing with technical, economic

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Brotman is a frequent analyst for leading newspapers and magazines, including *Fortune*,

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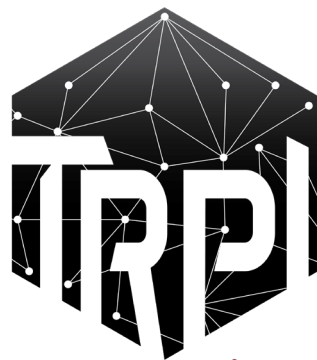
Data collection was concluded on February 25, 2018. The views expressed herein are those of the author, and any omissions or errors are to be attributed solely to me.

*Stuart N. Brotman*

### **About Telecommunications Research and Policy Institute (TRPI)**

The Telecommunications Research and Policy Institute (TRPI) is a nonprofit organization formed in 2016. It serves as a sponsor of communications policy research and as a conduit for discussion and exploration of issues vital to communications companies, government regulators and consumers in the digital age.





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