Cisco Visual Networking Index (VNI) Complete Forecast Update, 2017–2022
APJC Cisco Knowledge Network (CKN) Presentation

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December 2018
Global Internet Growth and Trends

Key Digital Transformers

By 2022

<table>
<thead>
<tr>
<th>Year</th>
<th>More Internet Users</th>
<th>More Devices &amp; Connections</th>
<th>Faster Broadband Speeds</th>
<th>More Video Viewing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>3.4 Billion</td>
<td>18.0 Billion</td>
<td>39.0 Mbps</td>
<td>75% of Traffic</td>
</tr>
<tr>
<td>2022</td>
<td>4.8 Billion</td>
<td>28.5 Billion</td>
<td>75.4 Mbps</td>
<td>82% of Traffic</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Internet Growth and Trends

Key Digital Transformers

By 2022

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>More Internet Users</td>
<td>1.7 Billion</td>
<td>2.6 Billion</td>
</tr>
<tr>
<td>More Devices &amp; Connections</td>
<td>8.6 Billion</td>
<td>13.1 Billion</td>
</tr>
<tr>
<td>Faster Broadband Speeds</td>
<td>46.2 Mbps</td>
<td>98.8 Mbps</td>
</tr>
<tr>
<td>More Video Viewing</td>
<td>74% of Traffic</td>
<td>84% of Traffic</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Overview
Establishing the Zettabyte Era

By 2022, global IP traffic will reach an annual run rate of 4.8 zettabytes per year

4.8 zettabytes is equal to:

• Nearly 11X more than all IP traffic generated in 2012 (437 exabytes)
• All movies ever made crossing global IP networks in less than a minute (53 seconds)

What is a zettabyte?

One trillion gigabytes
Approximately $10^{21}$
(1,000,000,000,000,000,000,000 bytes)

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
VNI Projections and Actuals (Global)
Actual growth has been within ±10% of projected growth

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global IP Traffic Growth
Global IP traffic will increase 3-fold from 2017 to 2022

26% CAGR
2017–2022

Exabytes per Month

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global IP Traffic Growth by Region

MEA has the highest growth rate (41%) from 2017 to 2022.
APAC will generate 44% of all IP traffic by 2022.
Fixed and Mobile Growth in 2017
Most countries have higher mobile than fixed growth
But there are a growing number of exceptions

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Top Trends
Top Trends

Devices & Connections
1. Devices/Connections Mix
2. IoT/M2M by Verticals
3. IPv6 Adoption

Traffic Trends
4. Traffic Growth by App
5. Traffic Pattern Analysis
6. “Cord-Cutting”

Network Performance and User Experience
7. Wi-Fi Momentum
8. Accelerating Speeds
9. Security Analysis
Top Trends

**Devices & Connections**
1. Devices/Connections Mix
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**Network Performance and User Experience**
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9. Security Analysis
Global Device/Connection Growth by Type

By 2022, M2M connections will be more than half of total connections

* Figures (n) refer to 2017, 2022 device share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Device/Connection Growth by Type

By 2022, M2M connections will be nearly half of total connections

9% CAGR
2017–2022

Billions of Devices

Other (0.9%,1.5%)
Tablets (3%,3%)
PCs (6%,4%)
TVs (11%,11%)
Non-Smartphones (19%,6%)
Smartphones (28%,27%)
M2M (32%, 48%)

* Figures (n) refer to 2017, 2022 device share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Devices and Connections
Average per capita and per household

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Number of Devices and Connections per Capita</td>
<td>2.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Average Number of Devices and Connections per Household*</td>
<td>6.4</td>
<td>9.0</td>
</tr>
</tbody>
</table>

* Household average includes only Consumer devices and connections

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Devices and Connections
Average per capita and per household

Average Number of Devices and Connections per Capita
- 2017: 2.1
- 2022: 3.1

Average Number of Devices and Connections per Household*
- 2017: 5.9
- 2022: 8.2

* Household average includes only Consumer devices and connections

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
By 2022, nearly half (48%) of total devices and connections will be video capable.

Global Video Capable Device Growth by Type

8% CAGR
2017–2022

* Figures (n) refer to 2017, 2022 device share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Increasing Video Definition

By 2022, nearly two-thirds (62%) of connected flat panel TVs will support 4K

38% CAGR
2017–2022

UHD 15 – 18 Mbps
HD 5 – 7.2 Mbps
SD 2 Mbps

Connected 4K TV Sets (M)

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
High Definition Content Impacts IP Video Growth

UHD IP video will account for 22% of global IP video traffic by 2022

29% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC High Definition Content Impacts IP Video Growth

UHD IP video will account for 19% of APAC IP video traffic by 2022

35% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
High Definition Content Impacts IP VoD Growth
UHD VoD will account for 35% of global IP VoD traffic by 2022

12% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
### Global Average IP Traffic Per Device

<table>
<thead>
<tr>
<th>Device</th>
<th>2017 (MBs per Month)</th>
<th>2022 (MBs per Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2M Module</td>
<td>610</td>
<td>1,730</td>
</tr>
<tr>
<td>Smartphone</td>
<td>5,110</td>
<td>26,100</td>
</tr>
<tr>
<td>Tablet</td>
<td>10,380</td>
<td>31,140</td>
</tr>
<tr>
<td>Laptop / PC</td>
<td>35,950</td>
<td>59,250</td>
</tr>
<tr>
<td>Ultra High Definition TV*</td>
<td>7,520</td>
<td>35,840</td>
</tr>
</tbody>
</table>

*Includes IP VoD traffic

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
### APAC Average IP Traffic Per Device

<table>
<thead>
<tr>
<th>Device</th>
<th>2017 MBs per Month</th>
<th>2022 MBs per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2M Module</td>
<td>490</td>
<td>1,550</td>
</tr>
<tr>
<td>Smartphone</td>
<td>4,900</td>
<td>28,160</td>
</tr>
<tr>
<td>Tablet</td>
<td>9,410</td>
<td>24,790</td>
</tr>
<tr>
<td>Laptop / PC</td>
<td>32,220</td>
<td>51,520</td>
</tr>
<tr>
<td>Ultra High Definition TV*</td>
<td>4,720</td>
<td>21,510</td>
</tr>
</tbody>
</table>

*Note: Includes IP VoD traffic

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global IP Traffic by Device Type
By 2022, non-PC devices will drive 81% of global IP traffic

26% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC IP Traffic by Device Type
By 2022, non-PC devices will drive 86% of regional IP traffic

32% CAGR
2017–2022

![Graph showing APAC IP Traffic by Device Type from 2017 to 2022]

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Internet Traffic by Device Type
By 2022, non-PC devices will drive 81% of global Internet traffic

30% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Internet Traffic by Device Type
By 2022, non-PC devices will drive 86% of regional Internet traffic

35% CAGR
2017–2022

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022

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Top Trends

Devices & Connections
- Devices/Connections Mix
- IoT/M2M by Verticals
- IPv6 Adoption

Traffic Trends
- Traffic Growth by App
- Traffic Pattern Analysis
- “Cord-Cutting”

Network Performance and User Experience
- Wi-Fi Momentum
- Accelerating Speeds
- Security Analysis
Global M2M Connections / IoT Growth
By 2022, 1.8 M2M connections per capita globally

19% CAGR
2017–2022

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global M2M Traffic Growth
M2M traffic will grow more than 7-fold from 2017 to 2022

47% CAGR
2017–2022

Exabytes per Month

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
By 2022, M2M modules will be 51% (14.6 billion) of total global devices and connections and will account for 6% (25.3 EBs/month) of total global IP traffic.

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
By 2022, M2M modules will be **48% (6.3 billion)** of total APAC devices and connections and will account for **6% (9.8 EBs/month)** of total regional IP traffic.

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connected Home</strong></td>
<td>• Home automation</td>
</tr>
<tr>
<td></td>
<td>• Building security</td>
</tr>
<tr>
<td></td>
<td>• Network equipment – printers +</td>
</tr>
<tr>
<td></td>
<td>• Network infrastructure – routers +</td>
</tr>
<tr>
<td></td>
<td>• White goods</td>
</tr>
<tr>
<td></td>
<td>• Tracking applications</td>
</tr>
<tr>
<td></td>
<td>• Household information devices</td>
</tr>
<tr>
<td><strong>Connected Health</strong></td>
<td>• Health monitors</td>
</tr>
<tr>
<td></td>
<td>• Assisted living – medicine dispensers +</td>
</tr>
<tr>
<td></td>
<td>• Clinical trials</td>
</tr>
<tr>
<td></td>
<td>• First responder connectivity</td>
</tr>
<tr>
<td></td>
<td>• Telemedicine</td>
</tr>
<tr>
<td><strong>Connected Cities</strong></td>
<td>• Environment and public safety – closed-circuit TV, street lighting, waste removal, information +</td>
</tr>
<tr>
<td></td>
<td>• Public space advertising</td>
</tr>
<tr>
<td></td>
<td>• Public transport</td>
</tr>
<tr>
<td></td>
<td>• Road traffic management</td>
</tr>
<tr>
<td><strong>Connected Work</strong></td>
<td>• Office building automation</td>
</tr>
<tr>
<td></td>
<td>• Building security</td>
</tr>
<tr>
<td></td>
<td>• Office equipment – printers +</td>
</tr>
<tr>
<td></td>
<td>• Routers +</td>
</tr>
<tr>
<td></td>
<td>• Commercial appliances</td>
</tr>
<tr>
<td><strong>Connected Car</strong></td>
<td>• Fleet management</td>
</tr>
<tr>
<td></td>
<td>• In-vehicle entertainment systems, emergency calling, Internet</td>
</tr>
<tr>
<td></td>
<td>• Vehicle diagnostics, navigation</td>
</tr>
<tr>
<td></td>
<td>• Stolen vehicle recovery</td>
</tr>
<tr>
<td></td>
<td>• Lease, rental, insurance management</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td>• Retail goods monitoring and payment</td>
</tr>
<tr>
<td></td>
<td>• Retail venue access and control</td>
</tr>
<tr>
<td></td>
<td>• Slot machines, vending machines</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>• New energy sources – monitoring and power generation support apps</td>
</tr>
<tr>
<td></td>
<td>• Smart grid and distribution</td>
</tr>
<tr>
<td></td>
<td>• Micro-generation – generation of power, by residential, commercial and community users on their own property</td>
</tr>
<tr>
<td><strong>Manufacturing &amp; Supply Chain</strong></td>
<td>• Mining and extraction</td>
</tr>
<tr>
<td></td>
<td>• Manufacturing and processing</td>
</tr>
<tr>
<td></td>
<td>• Supply chain</td>
</tr>
<tr>
<td></td>
<td>• Warehousing and storage</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>• Agriculture – livestock, soil monitoring, water and resource conservation, temperature control for milk tanks +</td>
</tr>
<tr>
<td></td>
<td>• Construction: Site and equipment monitoring</td>
</tr>
<tr>
<td></td>
<td>• Emergency services and national security</td>
</tr>
</tbody>
</table>
Global M2M Connections / IoT Growth by Vertical
By 2022, connected home largest, connected car fastest growth

19% CAGR
2017–2022

Billions of M2M Connections

2017 2018 2019 2020 2021 2022

Other (30% CAGR)
Energy (24% CAGR)
Retail (10% CAGR)
Mfg & Supply Chain (10% CAGR)
Connected Car (28% CAGR)
Connected Cities (26% CAGR)
Connected Health (22% CAGR)
Connected Work (15% CAGR)
Connected Home (20% CAGR)

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC M2M Connections / IoT Growth by Vertical

By 2022, connected home largest, connected car fastest growth

18% CAGR
2017–2022

Billions of M2M Connections

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Top Trends

**Devices & Connections**
1. Devices/Connections Mix
2. IoT/M2M by Verticals
3. IPv6 Adoption

**Traffic Trends**
4. Traffic Growth by App
5. Traffic Pattern Analysis
6. “Cord-Cutting”

**Network Performance and User Experience**
7. Wi-Fi Momentum
8. Accelerating Speeds
9. Security Analysis
Global IPv6-Capable Devices/Connections
By 2022, 64% of devices/connections will be IPv6-capable

26% CAGR
2017–2022

Number of Devices (Billions)

IPv6 Capable Mobile Devices
IPv6 Capable Fixed Devices

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC IPv6-Capable Devices/Connections

By 2022, nearly 60% of devices/connections will be IPv6-capable

24% CAGR
2017–2022

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global IPv6 Traffic Growth / Regions
By 2022, IPv6 will represent 38% of total Internet traffic

77% CAGR
2017–2022

Exabytes per Month

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Top Trends

Devices & Connections
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Global IP Traffic by Application Type
By 2022, video will account for 82% of global IP traffic

26% CAGR
2017–2022

Exabytes per Month

<table>
<thead>
<tr>
<th>Year</th>
<th>Gaming (1%,4%)</th>
<th>File Sharing (7%,2%)</th>
<th>Web/Data (17%,12%)</th>
<th>IP VOD/Managed IP Video (20%,11%)</th>
<th>Internet Video (55%, 71%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>2019</td>
<td></td>
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<tr>
<td>2020</td>
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<tr>
<td>2021</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>2022</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Asia Pacific IP Traffic by Application Type
By 2022, video will account for 84% of Asia Pacific IP traffic

32% CAGR
2017–2022

Exabytes per Month

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Internet Video Traffic by Type

By 2022, live video will increase 15-fold and reach 17% of Internet video traffic

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Virtual and Augmented Reality Traffic

By 2022, VR/AR traffic will increase 12-fold

65% CAGR
2017–2022

Exabytes per Month

<table>
<thead>
<tr>
<th>Year</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exabyte</td>
<td>0.33</td>
<td>0.57</td>
<td>1.12</td>
<td>1.81</td>
<td>2.82</td>
<td>4.02</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022

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Top Trends

Devices & Connections
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Average Global Internet Bandwidth Usage

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2022</th>
<th>Future?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Traffic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per User per Month</td>
<td>29 GB</td>
<td>85 GB</td>
<td>200 GB</td>
</tr>
<tr>
<td>Average Traffic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per Household* per Month</td>
<td>82 GB</td>
<td>240 GB</td>
<td>500 GB</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Average APAC Internet Bandwidth Usage

Average Traffic per User per Month
- 20 GB (2017)
- 69 GB (2022)
- 200 GB (Future?)

Average Traffic per Household* per Month
- 60 GB (2017)
- 205 GB (2022)
- 500 GB (Future?)

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Internet Households Reshape Usage Limits

Internet households exceeding 1 TB more than doubled in 2017

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Busy-Hour vs. Average Hour Internet Traffic

By 2022, busy Internet traffic will be nearly 6X greater than average traffic

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Busy-Hour vs. Average Hour Internet Traffic

By 2022, busy Internet traffic will be 5X greater than average traffic.

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Content Delivery Network (CDN) Traffic
CDNs will deliver 72 percent of Internet traffic by 2022

30% CAGR
2017–2022

Exabytes per Month

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022

* Figures (n) refer to 2017, 2022 traffic share
SP Network Capacity Moving Closer to the Edge
Over one-third of capacity will bypass core completely by 2022

Core – Cross-Country
48% in 2017
43% by 2022

Core – Regional
25% by 2017
24% by 2022

Within Metro
27% in 2017
33% by 2022
Global Enterprise SD-WAN Traffic

SD-WAN traffic will grow at a CAGR of 37% compared to 3% for traditional WAN. SD-WAN will increase 5x and will be 29% of WAN traffic by 2022.

9% CAGR
2017–2022

Exabytes per Month

SD-WAN Traffic (8.9%, 28.8%)
Traditional IP WAN Traffic (91%, 71.2%)

* Figures (n) refer to 2017, 2022 traffic share

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
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Global Digital Media Adapters* Growth
By 2022, DMAs will represent 9% of global Internet connected TV traffic.

10% CAGR 2017–2022

<table>
<thead>
<tr>
<th>Year</th>
<th>Digital Media Adapters (M)</th>
<th>DMA Traffic (EB/Month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>173.0</td>
<td>6.3</td>
</tr>
<tr>
<td>2018</td>
<td>204.6</td>
<td>8.5</td>
</tr>
<tr>
<td>2019</td>
<td>231.8</td>
<td>10.9</td>
</tr>
<tr>
<td>2020</td>
<td>252.0</td>
<td>13.2</td>
</tr>
<tr>
<td>2021</td>
<td>265.2</td>
<td>15.3</td>
</tr>
<tr>
<td>2022</td>
<td>273.7</td>
<td>17.1</td>
</tr>
</tbody>
</table>

22% CAGR 2017–2022

* DMAs include devices such as Roku, Apple TV, Chromecast

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Cord-Cutting Household Traffic Is 72% Higher

A global cord-cutting household generates 141 GB per month in 2017, compared to 82 GB per month for an average household.

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
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Global Wi-Fi Hotspot Coverage and Availability

**Existing**
- Pay-as-you-go
- Free access promoting other services (Retail free Wi-Fi)
- Managed services (venues and outdoor)
- Cellular offload (user promoted)
- Added value for broadband subscription
- Advertising & sponsorship

**Growth**
- Cellular offload (carrier driven)
- Community Wi-Fi/homespots
- Carrier-grade VoWiFi
- TV everywhere
- Large events
- Big data analytics
- Public transportation Wi-Fi

**Future**
- Wi-Fi Capacity trading
- Transaction platform
- Internet of things
- Context awareness
- HetNet Wi-Fi + mobile
- Connected car (in-car Wi-Fi)

**Total Public WLAN + Community Hotspots**
- 2017: 124 M
- 2022: 549 M

**Source:** Maravedis, Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Public Wi-Fi Hotspots
Asia Pacific leads with 261 Million (47%) Hotspots by 2022

35% CAGR
2017–2022

* Middle East and Africa represents 1% of global public Wi-Fi hotspots by 2022

Source: Maravedis, Cisco VNI Global IP Traffic Forecast, 2017–2022
By 2022, China will have 34% of global hotspots, the most number of hotspots (185 million) in the world.

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Future of Wired and Wireless Technologies

By 2022, 9.5% of total SOHO will be equipped with 802.11ax
By 2022, 86.9% of total SOHO will be equipped with 802.11ac
Future Wi-Fi Enables Virtualization, IoT, Speech Processing, Security, Data Analytics

802.11n
600 Mbps Max
Medium Resolution Video

802.11ac
3.6 Gbps Max
High Resolution Video
Wired Complement

802.11ax
10 Gbps Max
Dense IoT Deployment


DOCSIS 3.0
38 Mbps per channel

VDSL2
100 Mbps Max
Medium Resolution Video

DOCSIS 3.1
54 Mbps

VDSL2-VPlus
300 Mbps Max

Full Duplex
DOCSIS 3.1
10 Gbps symmetrical

G.fast
150–1000 Mbps Max.

Vast majority of 1Gig deployments will be DOCSIS 3.1
Fiber being moved even closer to subscribers
Future Wired Enables 4K, Immersive 360 video, VR, High Dynamic Range, High Frame Rate, 8K

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global IP Traffic by Local Access Technology
By 2022, 71% of total IP traffic will be wireless*

26% CAGR 2017–2022

Exabytes per Month

- Mobile (46% CAGR)
- Fixed/Wi-Fi from Wi-Fi-Only Devices (18% CAGR)
- Fixed/Wi-Fi from Mobile Devices (53% CAGR)
- Fixed/Wired (15% CAGR)

* Wireless traffic includes Wi-Fi and mobile

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC IP Traffic by Local Access Technology

By 2022, 77% of total IP traffic will be wireless*

32% CAGR 2017–2022

Exabytes per Month

- Mobile (49% CAGR)
- Fixed/Wi-Fi from Wi-Fi-Only Devices (20% CAGR)
- Fixed/Wi-Fi from Mobile Devices (56% CAGR)
- Fixed/Wired (15% CAGR)

* Wireless traffic includes Wi-Fi and mobile

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Internet Traffic by Local Access Technology

By 2022, 79% of total Internet traffic will be wireless*

* Wireless traffic includes Wi-Fi and mobile

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
APAC Internet Traffic by Local Access Technology
By 2022, 86% of total Internet traffic will be wireless*

* Wireless traffic includes Wi-Fi and mobile

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Top Trends

Devices & Connections
1. Devices/Connections Mix
2. IoT/M2M by Verticals
3. IPv6 Adoption

Traffic Trends
4. Traffic Growth by App
5. Traffic Pattern Analysis
6. “Cord-Cutting”

Network Performance and User Experience
7. Wi-Fi Momentum
8. Accelerating Speeds
9. Security Analysis
### Global Average Fixed Broadband Speeds

Doubling in speeds from 2017–2022

<table>
<thead>
<tr>
<th>Region</th>
<th>In Mbps</th>
<th>2017</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLOBAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global</td>
<td></td>
<td>39.0</td>
<td>75.4</td>
</tr>
<tr>
<td><strong>BY REGION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia Pacific</td>
<td></td>
<td>46.2</td>
<td>98.8</td>
</tr>
<tr>
<td>Latin America</td>
<td></td>
<td>11.7</td>
<td>28.1</td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td>43.2</td>
<td>94.2</td>
</tr>
<tr>
<td>Western Europe</td>
<td></td>
<td>37.9</td>
<td>76.0</td>
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<tr>
<td>Central and Eastern Europe</td>
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<td>32.8</td>
<td>46.7</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td></td>
<td>7.8</td>
<td>20.2</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Faster Networks Enable Better Experiences

- **10 Mbps**
  - 95% of all broadband connections by 2022
  - Online Video (HD movie download): 22 minutes
  - (UHD movie download): 2 hours

- **25 Mbps**
  - 79% of all broadband connections by 2022
  - Online Video (HD movie download): 9 minutes
  - (UHD movie download): 48 minutes

- **100 Mbps**
  - 24% of all broadband connections by 2022
  - Online Video (HD movie download): 2 minutes
  - (UHD movie download): 12 minutes

- **1 Gbps**
  - Futuristic
  - Online Video (HD movie download): 1.2 ms
  - (UHD movie download): 7.2 ms
APAC Faster Networks Enable Better Experiences

- **10 Mbps**
  - 98% of all broadband connections by 2022
  - Online Video (HD movie download): 22 minutes
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  - 93% of all broadband connections by 2022
  - Online Video (HD movie download): 9 minutes
  - (UHD movie download): 48 minutes

- **100 Mbps**
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  - (UHD movie download): 12 minutes

- **1 Gbps**
  - Futuristic
  - Online Video (HD movie download): 1.2 ms
  - (UHD movie download): 7.2 ms
Video in the Home of Today and the Future
Significant demand for video in the home of the future

Application requirements In Mbps

Today
- HD Camera: 2 Mbps
- IP Video: 8 Mbps
- 2 UHD Cameras: 16 Mbps
- UHD Streaming: 17 Mbps
- VR: 51 Mbps
- UHD IP Video: 100 Mbps
- UHD VR: 167 Mbps

Future
- HD VR: 500 Mbps
- 8K Wall TV: 100 Mbps
- UHD VR: 167 Mbps
Global Average Wi-Fi Speeds
Wi-Fi speeds double from 2017–2022

<table>
<thead>
<tr>
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<th>2017</th>
<th>2022</th>
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<tbody>
<tr>
<td><strong>GLOBAL</strong></td>
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<tr>
<td>Global</td>
<td>24.4</td>
<td>54.2</td>
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<tr>
<td><strong>BY REGION</strong></td>
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<td></td>
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<tr>
<td>Asia Pacific</td>
<td>26.7</td>
<td>63.3</td>
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<tr>
<td>Latin America</td>
<td>9.0</td>
<td>16.8</td>
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<tr>
<td>North America</td>
<td>37.1</td>
<td>83.8</td>
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<tr>
<td>Western Europe</td>
<td>25.0</td>
<td>49.5</td>
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<tr>
<td>Central and Eastern Europe</td>
<td>19.5</td>
<td>32.8</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>6.2</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
Global Average Cellular Speeds
Mobile/Cellular speeds double from 2017–2022

<table>
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Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
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4 Traffic Growth by App
5 Traffic Pattern Analysis
6 “Cord-Cutting”

Network Performance and User Experience
7 Wi-Fi Momentum
8 Accelerating Speeds
9 Security Analysis
DDoS Attack Size and Traffic Increasing

Peak attack size increased **174% Y/Y**.*

DDoS attacks can represent up to **25%** of a country’s total Internet traffic while they are occurring.

Average DDoS attack size between 1-2 Gbps increased **37% Y/Y** which is faster than Internet traffic at **33% Y/Y**.

* 1H2017 - 1H2018

Source: Arbor Networks, Cisco VNI Global IP Traffic Forecast, 2017-2022
Number of DDoS Attacks
Attacks will double to 14.5 million by 2022 globally

Source: Cisco VNI Global IP Traffic Forecast, 2017–2022
39,554 Records Exposed per Breach

Total Breaches: 864
Highest in Business: 46.8%

Records Exposed: 34.2 Million
Highest in Business: 63.7%

Source: 2018 Identity Theft Resource Center
Accessing Cisco VNI Forecast Resources


- Press Release
- White Paper / FAQ
- Cisco VNI Web-based Tools

SalesConnect: [https://salesconnect.cisco.com/#/program/PAGE-10578](https://salesconnect.cisco.com/#/program/PAGE-10578)
Cisco VNI Forecast Inquiries: [traffic-inquiries@cisco.com](mailto:traffic-inquiries@cisco.com)
Cisco VNI/ GCI Community: [https://cisco.com/go/discussions-vni-gci](https://cisco.com/go/discussions-vni-gci)