



Global – 2021 Forecast Highlights

IP Traffic

- Globally, IP traffic will grow 3-fold from 2016 to 2021, a compound annual growth rate of 24%.
- Globally, IP traffic will reach 278.1 Exabytes per month in 2021, up from 96.1 Exabytes per month in 2016.
- Global IP networks will carry 9.1 Exabytes per day in 2021, up from 3.2 Exabytes per day in 2016.
- Globally, IP traffic will reach an annual run rate of 3.3 Zettabytes in 2021, up from an annual run rate of 1.2 Zettabytes in 2016.
- Globally, IP traffic will reach 35 Gigabytes per capita in 2021, up from 13 Gigabytes per capita in 2016.
- Globally, average IP traffic will reach 847 Tbps in 2021, and busy hour traffic will reach 5.0 Pbps.
- In 2021, the gigabyte equivalent of all movies ever made will cross Global IP networks every 1 minutes.

Internet Traffic

- Globally, Internet traffic will grow 3.2-fold from 2016 to 2021, a compound annual growth rate of 26%.
- Globally, busy hour Internet traffic will grow 4.6-fold from 2016 to 2021, a compound annual growth rate of 35%.
- Globally, Internet traffic will reach 235.7 Exabytes per month in 2021, up from 73.1 Exabytes per month in 2016.
- Global Internet traffic will be 7.7 Exabytes per day in 2021, up from 2.4 Exabytes per day in 2016.
- Global Internet traffic in 2021 will be equivalent to 707 billion DVDs per year, 59 billion DVDs per month, or 81 million DVDs per hour.

- In 2021, the gigabyte equivalent of all movies ever made will cross the Internet every 1 minutes.
- Global Internet traffic in 2021 will be equivalent to 135x the volume of the entire Global Internet in 2005.
- Globally, Internet traffic will reach 30 Gigabytes per capita in 2021, up from 10 Gigabytes per capita in 2016.
- Globally, average Internet traffic will increase 3.2-fold by 2021 and will reach 717 Tbps.
- Globally, busy hour Internet traffic will increase 4.6-fold by 2021 and will reach 4.3 Pbps.
- Globally, the number of DDoS attacks greater than 1 Gbps will grow 2.5-fold from 2016 to 2021, a compound annual growth rate of 20%.
- Globally, the number of DDoS attacks greater than 1 Gbps will be 3.1 million per year in 2021, up from 1.3 million per year in 2016.

Wired Wi-Fi and Mobile Growth

- Global Fixed/Wi-Fi was 41% of total IP traffic in 2016, and will be 46% of total IP traffic in 2021.
- Global Fixed/Wired was 51% of total IP traffic in 2016, and will be 37% of total IP traffic in 2021.
- Global Mobile was 7% of total IP traffic in 2016, and will be 17% of total IP traffic in 2021.
- Global Fixed/Wi-Fi was 52.1% of total Internet traffic in 2016, and will be 52.6% of total Internet traffic in 2021.
- Global Fixed/Wired was 38% of total Internet traffic in 2016, and will be 27% of total Internet traffic in 2021.
- Global Mobile was 9.8% of total Internet traffic in 2016, and will be 20.5% of total Internet traffic in 2021.
- Globally, mobile data traffic will grow 7-fold from 2016 to 2021, a compound annual growth rate of 46%.
- Globally, mobile data traffic will reach 48.3 Exabytes per month in 2021, up from 7.2 Exabytes per month in 2016.
- Global mobile data traffic will grow 2 times faster than Global fixed IP traffic from 2016 to 2021.
- Global Mobile was 7% of total IP traffic in 2016, and will be 17% of total IP traffic in 2021.
- Globally, mobile data traffic in 2021 will be equivalent to 23x the volume of the entire Global Internet in 2005.

IP Video

- Globally, IP video traffic will grow 3-fold from 2016 to 2021, a compound annual growth rate of 26%.
- Globally, IP video traffic will reach 227.6 Exabytes per month in 2021, up from 70.3 Exabytes per month in 2016.
- Globally, IP video will be 82% of all IP traffic in 2021, up from 73% in 2016.
- Globally, Ultra HD will be 20.7% of IP Video traffic in 2021, up from 1.8% in 2016 (106.4% CAGR).
- Globally, HD will be 57.1% of IP Video traffic in 2021, up from 46.8% in 2016 (31.6% CAGR).
- Globally, SD will be 22.2% of IP Video traffic in 2021, compared to 51.4% in 2016 (6.9% CAGR).

- Globally, consumer IP video traffic will be 84% of consumer IP traffic in 2021, up from 79% in 2016.
- Globally, business IP video traffic will be 69% of business IP traffic in 2021, up from 49% in 2016.

Internet Video

- Globally, Internet video traffic will grow 4-fold from 2016 to 2021, a compound annual growth rate of 31%.
- Globally, Internet video traffic will reach 187.4 Exabytes per month in 2021, up from 49.4 Exabytes per month in 2016.
- Globally, total Internet video traffic (business and consumer, combined) will be 80% of all Internet traffic in 2021, up from 67% in 2016.
- Globally, Ultra HD will be 19.2% of Internet video traffic in 2021, up from 2.2% in 2016 (101.4% CAGR).
- Globally, HD will be 56.3% of Internet video traffic in 2021, up from 36.4% in 2016 (42.5% CAGR).
- Globally, SD will be 24.5% of Internet video traffic in 2021, compared to 61.4% in 2016 (8.6% CAGR).
- Globally, consumer Internet video traffic will be 81% of consumer Internet traffic in 2021, up from 72% in 2016.
- Globally, business Internet video traffic will be 70% of business Internet traffic in 2021, up from 51% in 2016.
- Globally, Internet-Video-to-TV traffic will be 34% of fixed consumer Internet video traffic in 2021, up from 33% in 2016.
- Globally, Internet-Video-to-TV traffic will increase 3-fold between 2016 and 2021 (27.2% CAGR).
- Globally, 3 trillion minutes (5 million years) of video content will cross the Internet each month in 2021. That's 1.0 million minutes of video streamed or downloaded every second.
- Globally, 78% of all Internet video traffic will cross content delivery networks in 2021, up from 67% in 2016.
- Globally, 3.4% of all Internet video traffic will be due to Video Surveillance in 2021, up from 1.8% in 2016.
- Globally, Internet Video Surveillance traffic will increase 7-fold between 2016 and 2021 (48.9% CAGR).
- Globally, 0.9% of all entertainment traffic (Internet video and gaming) will be due to Virtual Reality in 2021, up from 0.1% in 2016.
- Globally, Virtual Reality traffic will increase 20-fold between 2016 and 2021 (82.2% CAGR).
- Globally, 73.8% of all Internet video traffic will be long-form video (including live) in 2021, up from 65.6% in 2016.
- Globally, 13.2% of all Internet video traffic will be Live video in 2021, up from 3.3% in 2016.
- Globally, Live Internet video traffic will increase 15-fold between 2016 and 2021 (71.9% CAGR).

IP VOD

- Globally, Ultra HD will be 30.0% of IP VOD traffic in 2021, up from 0.9% in 2016 (130.8% CAGR).
- Globally, HD will be 65.7% of IP VOD traffic in 2021, up from 76.2% in 2016 (10.3% CAGR).
- Globally, SD will be 4.3% of IP VOD traffic in 2021, compared to 22.9% in 2016 (-18.5% CAGR).

Gaming

- Globally, gaming traffic will grow 10-fold from 2016 to 2021, a compound annual growth rate of 57%.
- Globally, gaming traffic will reach 11.0 Exabytes per month in 2021, up from 1.2 Exabytes per month in 2016.
- Globally, gaming traffic will be 6% of consumer Internet traffic in 2021, up from 2% in 2016.

Devices

- Globally, there will be 27.1 billion networked devices in 2021, up from 17.1 billion in 2016.
- Globally, there will be 3.5 networked devices per capita in 2021, up from 2.3 per capita in 2016.
- Globally, 43% of all networked devices will be mobile-connected in 2021.
- Globally, M2M modules will account for 51% (13.7 billion) of all networked devices in 2021, compared to 34% (5.8 billion) in 2016, (18.8% CAGR).
- Globally, PCs will account for 5% (1.3 billion) of all networked devices in 2021, compared to 8% (1.4 billion) in 2016, (-2.5% CAGR).
- Globally, Tablets will account for 3% (749.5 million) of all networked devices in 2021, compared to 3% (580.3 million) in 2016, (5.3% CAGR).
- Globally, Smartphones will account for 23% (6.2 billion) of all networked devices in 2021, compared to 21% (3.6 billion) in 2016, (11% CAGR).
- Globally, Connected TVs will account for 12% (3.2 billion) of all networked devices in 2021, compared to 12% (2.0 billion) in 2016, (9.1% CAGR).
- Globally, Non-Smartphones will account for 5.7% (1.5 billion) of all networked devices in 2021, compared to 19% (3.3 billion) in 2016, (-14% CAGR).
- Globally, Other Portables will account for 2% (481.4 million) of all networked devices in 2021, compared to 2% (264.7 million) in 2016, (12.7% CAGR).
- Globally, 4K TVs will account for 56% (662.8 million) of all flat panel TVs in 2021, compared to 14.6% (84.6 million) in 2016, (50.9% CAGR).
- Global IP traffic from non-PC devices was 54% of total IP traffic in 2016, and will be 75% of total IP traffic in 2021.
- Globally, PCs accounted for 46% of IP traffic in 2016, and will be 25% of IP traffic in 2021.
- Globally, TVs accounted for 33% of IP traffic in 2016, and will be 30% of IP traffic in 2021.
- Globally, Smartphones accounted for 13% of IP traffic in 2016, and will be 33% of IP traffic in 2021.
- Globally, Tablets accounted for 5% of IP traffic in 2016, and will be 7% of IP traffic in 2021.
- Globally, M2M modules accounted for 2.0% of IP traffic in 2016, and will be 5.1% of IP traffic in 2021.

- Globally, PCs accounted for 52% of consumer Internet traffic in 2016, and will be 24% of consumer Internet traffic in 2021.
- Globally, TVs accounted for 21% of consumer Internet traffic in 2016, and will be 23% of consumer Internet traffic in 2021.
- Globally, TVs accounted for 16% of total Internet traffic in 2016, and will be 19% of total Internet traffic in 2021.

Speed Evolution

- Globally, the average fixed broadband speed will grow 1.9-fold from 2016 to 2021, from 27.5 Mbps to 53.0 Mbps.
- Globally, 96% of fixed broadband connections will be faster than 5 Mbps in 2021, up from 79% today.
- Globally, 85% of fixed broadband connections will be faster than 10 Mbps in 2021, up from 63% today.
- Globally, 50.6% of fixed broadband connections will be faster than 25 Mbps in 2021, up from 32.2% today.
- Globally, 48.0% of fixed broadband connections will be faster than 50 Mbps in 2021, up from 20.8% today.
- Globally, the average Wi-Fi speeds from mobile devices will grow 2.0-fold from 2016 to 2021, from 18.2 Mbps to 37 Mbps.
- Globally, the average mobile connection speed will grow 3-fold from 2016 to 2021, reaching 20 Mbps in 2021.

Traffic per User and Household

- Globally, the average Internet user will generate 57.0 Gigabytes of Internet traffic per month in 2021, up 139% from 23.9 Gigabytes per month in 2016, a CAGR of 19%.
- Globally, the average Internet household will generate 155.0 Gigabytes of Internet traffic per month in 2021, up 146% from 62.9 Gigabytes per month in 2016, a CAGR of 20%.
- Globally, the average FTTx Internet household will generate 183.2 Gigabytes of Internet traffic per month in 2021, 11.4% more than other broadband households.
- Globally, the average FTTx Internet household generated 84.4 Gigabytes of Internet traffic per month in 2016, 27.8% more than other broadband households.
- Globally, there will be 163 million Internet households (17.1% of all Internet households) generating more than 250 Gigabytes per month in 2021.
- Globally, there will be 71 million households (7.5% of all Internet households) generating more than 500 Gigabytes per month in 2021.
- Globally, there will be 32 million households (3.3% of all Internet households) generating more than a terabyte per month in 2021.
- Globally, the average mobile connection will generate 5,373 Megabytes of mobile data traffic per month in 2021, up from 972 Megabytes in 2016.

Traffic Topology and Traffic Patterns

- Globally, 35% of Internet traffic will be carried metro-to-metro in 2021, up from 22% in 2016.
- Globally, 23% of Internet traffic will be carried on regional backbones (without touching cross-country backbones) in 2021, compared to 20% in 2016.
- Globally, 41% of Internet traffic will traverse cross-country backbones in 2021, compared to 58% in 2016.
- Globally, 71% of all Internet traffic will cross content delivery networks in 2021, up from 52% in 2016.

- Globally, peak Internet traffic will grow at a compound annual growth rate of 35% from 2016 to 2021, compared to 26% for average Internet traffic.