



AT&T 10x Case Study:

AT&T Video Optimizer helps developers improve viewers' mobile app and video experience while lowering energy usage and emissions



AT&T 10x Case Study:

AT&T Video Optimizer helps developers improve viewers' mobile app and video experience while lowering energy usage and emissions

AT&T believes technology plays a critical role in reducing carbon emissions. So, we're using the power of our network to create a better, more environmentally sustainable world. We've set a goal to enable carbon savings for our customers 10x the footprint of our operations by the end of 2025.

To meet this, we're working to make our operations more efficient across the company. We're also working with our customers and technology partners to implement and scale carbon-saving solutions. This case study discusses and quantifies the carbon benefits of using AT&T technology to boost efficiency. This is one study in a series we're sharing as we progress toward our 10x goal.

Learn about our goals, our progress, and see more case studies like this at att.com/10x.

Summary

With the rise of high-speed mobile connectivity, people are changing the way they watch their favorite show, news program, movie or short videos. It's becoming all about the mobile device, as in the second quarter of 2019, more than half of global video views started on smartphones or tablets.¹

AT&T Video Optimizer is a free tool that helps app developers improve the performance of their apps, creating a better viewing experience for the end user. The tool also helps developers optimize mobile apps so that they use the mobile network efficiently. Not only does this make for a better user experience, but it also helps app providers save money on data center equipment that they don't have to use because they're serving content more efficiently.

AT&T Video Optimizer also has a less obvious benefit: optimized video reduces the energy needed to run the network equipment that transmits the videos. This results in lower greenhouse gas (GHG) emissions associated with the entertainment we watch from our mobile devices. Since the AT&T Video Optimizer was introduced in 2012 and used by mobile apps around the world, it is estimated that it has helped lower global electricity usage by more than **42,000 kilowatt hours a year**, reducing GHG emissions equivalent to not using over **2.7 million gallons of gasoline annually**.²

Estimated annual global environmental benefits of AT&T Video Optimizer



More than **42,000 kilowatt hours** of electricity savings equivalent to:



More than **2.7 million gallons** of gasoline avoided

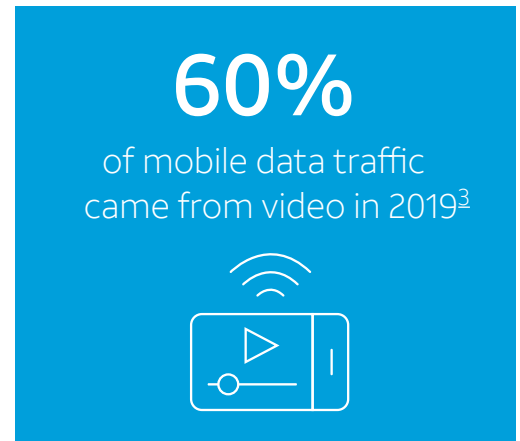
or



More than **25,000 metric tons** of CO₂e avoided

Background: Mobile video usage is growing rapidly

As more mobile apps use embedded video and streaming becomes more popular, video streaming services in terms of both subscribers and viewing time per subscriber have grown.³ Stimulating the growth even more is the advancements in higher screen resolutions on mobile devices.⁴ This is already impacting the makeup of communications network traffic as more than 60% of traffic came from video in 2019.⁵ This trend is expected to continue. In fact, a 2019 report by Ericsson forecasted that video traffic on mobile networks will grow by around 30% annually.⁵

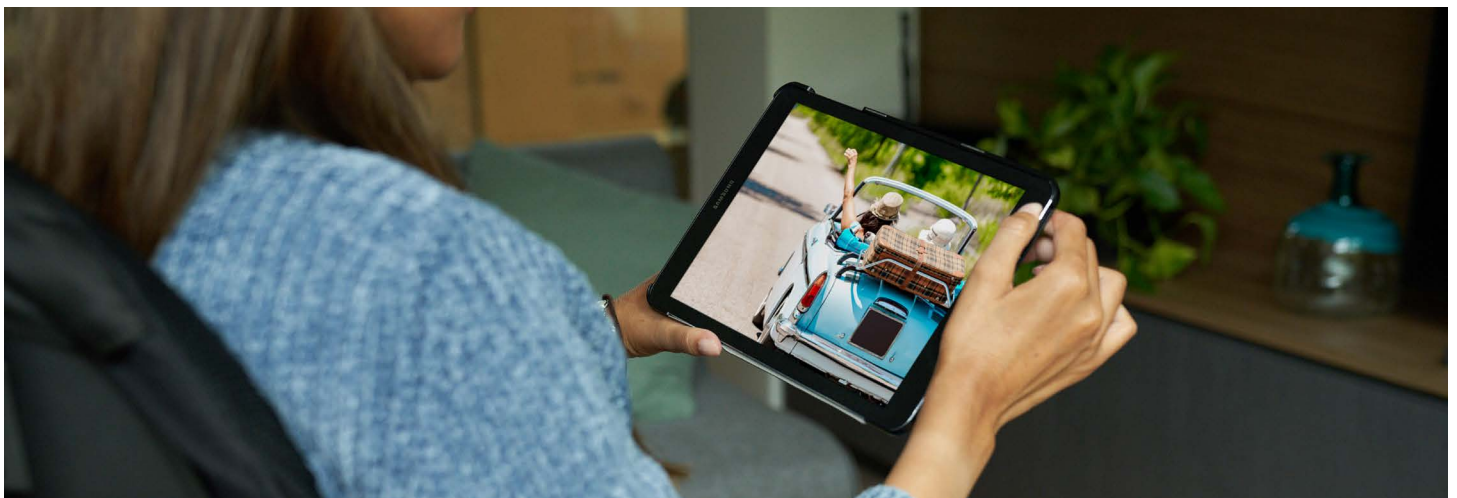


The Challenge: As more video goes mobile, efficient use of the wireless network becomes critical

Video is popping up across different types of mobile apps. From video streaming platforms to news and sports outlets, video is becoming a fundamental piece of our mobile user experience. However, making this experience enjoyable can be very challenging, and app developers are looking for ways to address several common issues such as:

- Startup delays
- Video stalls
- Poor video quality
- Slow responsiveness
- Excessive data usage
- Battery drain

These video performance challenges can be addressed by optimizing how video is distributed across the wireless network.



The Solution: AT&T Video Optimizer helps video content distributors use less bandwidth, improving customer experience while reducing costs, energy and emissions

The [AT&T Video Optimizer](#) is a tool AT&T created to help developers optimize the performance of their apps on a mobile network. The tool identifies 47 different best practices for app development and analyzes the app against all of them. And best of all, AT&T provides this tool for free.

The tool works on iOS and Android and it can be used for any application. The tool is particularly helpful to apps that require persistent network connection, such as social media, video and audio streaming, but since video is such a big traffic driver, video optimization has become a critical reason for a developer to use it.

AT&T Video Optimizer uses powerful analytics to detect critical issues such as wasted data traffic and excessive “chattiness” as a result of opening and closing connections inefficiently. It presents the findings in an easy-to-understand visual tool, making it is easy for the developer to identify and execute needed adjustments.

File Download: Text File Compression	✓
File Download: Duplicate Content	✓
File Download: Cache Control	✓
File Download: Content Expiration	✗
File Download: Combine JS and CSS Requests	✓
File Download: Resize Images for Mobile	✓
File Download: Image Metadata	✓
File Download: Image Compression	✗
File Download: Image Format	✗
File Download: Image Comparison	✗
File Download: Minify CSS, JS and HTML	✗
File Download: Use CSS Sprites for Images	👤
Connections: Connection Opening	👤
Connections: Unnecessary Connections - Multiple Simultaneous Connections	👤
Connections: Multiple Simultaneous Connections to One Endpoint	👤
Connections: Multiple Simultaneous Connections to Many Endpoints	✓

Visual tool: Simple stoplight visuals identify potential issues

Benefits for the viewers

For the people using a video streaming app, the benefit is straightforward: the video starts quickly and plays smoothly.

By optimizing the video with AT&T Video Optimizer, the app simply works better and is more responsive. Because the app only downloads the needed data – and equally important, doesn’t download data it doesn’t need – the user can enjoy a smoother experience.

Further, because the AT&T Video Optimizer helps content providers catch errors to reduce the amount of data that is transmitted, the end user needs less data, which is an additional benefit for users with a limited data plan.

This also means that the AT&T Video Optimizer can help extend device battery life and reduce charging needs, which can result in lower electricity usage by an estimated **2.5 million kilowatt hours globally** each year, which is like avoiding the associated GHGs of more than **57,000 gallons of gasoline annually**.

Benefits for the app developer

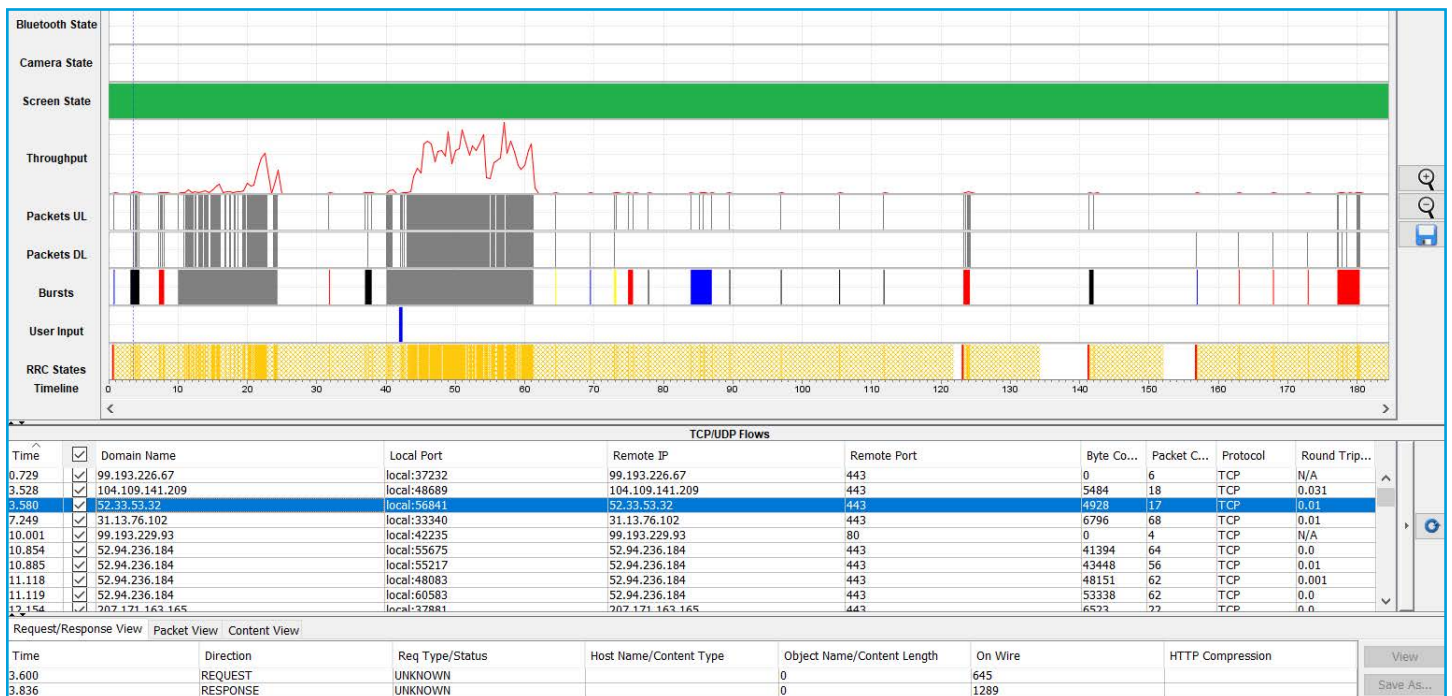
The AT&T Video Optimizer has been used by many of the leading video content providers, including WarnerMedia and HBO Max. By using this tool, developers can easily identify data-gobbling issues and fine-tune the app to eliminate waste. This helps the developers by providing a great customer experience, which is critical to success in the marketplace, while also helping to reduce costs.

By reducing unnecessary data transmitted by their apps, developers reduce their costs for network access and server load. For instance, a developer using the AT&T Video Optimizer to reduce data needs can also reduce data center costs such as investment in additional servers and the electricity needed to power them. Because much of this financial information is proprietary, this case study doesn't attempt to quantify these cost savings. However, based on AT&T's data center savings as a result of video optimization, we estimate that the cost savings are substantial.



AT&T Video Optimizer in action

A leading video app developer used the AT&T Video Optimizer to review an upcoming update to their platform and found that they weren't using text compression for subtitles. AT&T worked with the developer to identify the problem and a simple fix to reduce the amount of data transmitted during the video stream. That simple fix alone resulted in estimated data reductions of approximately **10%**.



Detailed data helps app developers identify opportunities to refine code.

Benefits for network providers like AT&T

For AT&T and other mobile network providers, the benefit of app developers using the AT&T Video Optimizer is simple: less video data traffic on the mobile network improves performance and congestion while reducing infrastructure and operating costs, including the costs and environmental impacts of electricity usage. In addition to a fundamental reduction of data transmission needs, the AT&T Video Optimizer also helps reduce the “chattiness” of apps, which streamlines the number of times data is requested and enhances network performance further.

For AT&T, this efficiency has helped the company avoid millions of dollars of unneeded server costs and hundreds of thousands of dollars in electricity costs since it started using the tool in 2012.

And because the tool is open-source, free, and used by developers with apps used around the world, the benefits apply to global communications networks, not just AT&T.

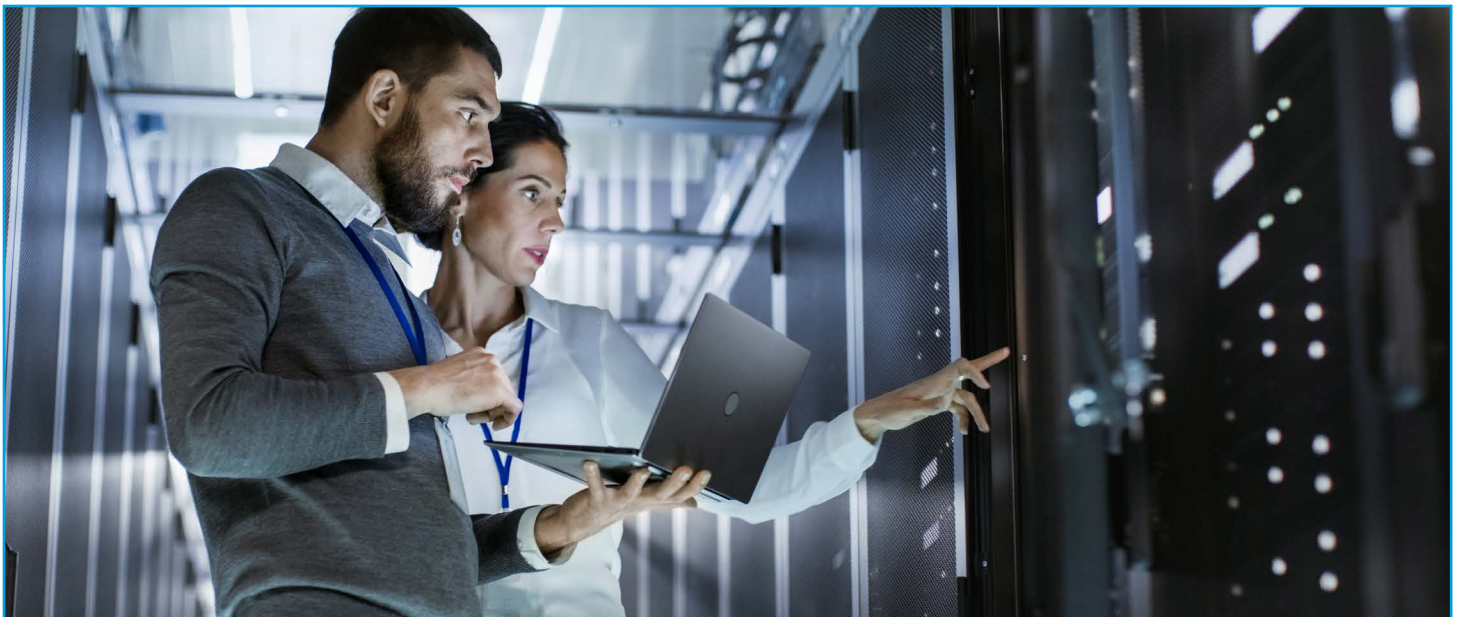
What's next? 5G optimization

Building on its success, the team behind the AT&T Video Optimizer is turning its attention to similar benefits that can be applied to 5G applications.

As 5G and edge computing gain momentum and content is pushed to the edge of the data network, it will be more important than ever to monitor data flow to drive traffic efficiency so that data isn't needlessly transmitted.

Using the same methodology developed for the AT&T Video Optimizer, the AT&T team hopes to drive similar data transmission efficiency into the next generation of 5G networks.

This work has the potential to create a better user experience and save money and energy for even more applications like gaming that will demand high capacity and low latency. And as mobile gaming becomes more popular, these benefits could really stack up.



Sustainability Impact: Efficient apps result in network and battery savings

It's no secret that mobile video is a big deal. If a picture is worth a thousand words, then mobile video is worth a chapter. That's why app developers are turning to tools like the AT&T Video Optimizer to improve the video watching experience for mobile users. In addition to the improved experience for the viewer, the Video Optimizer can also help save electricity. Because the benefits from AT&T Video Optimizer have global scale, even small adjustments to app code can result in an environmental benefit. When an app is optimized, the network energy efficiency benefits extend to wherever in the world the app is used. And smaller file size extends device battery life and reduces battery charging needs, reducing energy usage further. Together, these benefits add up to more than **42,000 kWh in electricity savings a year** across the globe, which is equivalent to more than **25,000 metric tons of CO₂e each year**, which is equivalent to:

The infographic consists of three blue rectangular boxes arranged horizontally. Each box contains an icon, a text description, and a central circle with the word 'OR'. The first box features a car icon and the text 'Taking more than 5,500 cars off the road'. The second box features a stack of three oil barrels with a drop of oil falling from the bottom one, and the text 'Not burning more than 2.85 million gallons of gasoline'. The third box features a lightbulb icon and the text 'Switching more than 960,000 incandescent bulbs to LEDs¹'. Vertical dotted lines separate the boxes.

Applying the 10x Carbon Impact Methodology

Carbon Trust and BSR collaborated with AT&T in the development of a methodology to measure the carbon benefits of AT&T's Video Optimizer technology. The details of the methodology can be found on the AT&T [10x website](#). The table below summarizes how the 10x methodology was applied to estimate the environmental impacts described in this case study.

<p>Description of the Enabling Technology</p>	<p>AT&T Video Optimizer helps app developers optimize apps with video by catching errors and identifying areas consuming both unnecessary amounts of data and airtime. By reducing the amount of data consumed and airtime, AT&T Video Optimizer decreases the energy needed to run the network equipment that transmits the videos and can help extend battery life of the mobile devices using the app. This results in lower electricity usage and lower associated GHG emissions.</p>
<p>Impact Category</p>	<p>This case study focuses on the carbon impact of energy savings from network and battery savings of mobile devices enabled by the AT&T Video Optimizer tool.</p>
<p>Materiality</p>	<p>Video apps that have been optimized using AT&T Video Optimizer consume both less battery on a mobile phone and decrease the energy consumed on the network, thereby reducing electricity usage and associated GHG emissions.</p>
<p>Attribution of Impacts</p>	<p>The carbon savings detailed in this case study are a result of using AT&T Video Optimizer tool to optimize the use of video apps.</p>
<p>Primary Effects</p>	<p>AT&T Video Optimizer tool helps optimize video apps, decreasing data usage and device battery drainage, which in turn leads to lower electricity consumption and lower associated GHG emissions.</p>
<p>Secondary Effects</p>	<p>No secondary effects were identified.</p>

<p>Rebound Effects</p>	<p>Increased use of video apps due to improved user experience.</p>
<p>Trade-Offs or Negative Effects</p>	<p>This tool does not appear to create other outsized or irreparable environmental or social impacts.</p>
<p>Carbon Burden from the Enabling Technology</p>	<p>There are no embodied carbon emissions from this tool.</p>
<p>Scope</p>	<p>The network savings across the AT&T network and the battery savings from users of video apps on AT&T's network from a selected number of apps.</p>
<p>Timeframe</p>	<p>The data in this case study covers data and airtime reductions and the associated energy and carbon savings from 2012 to 2019.</p>
<p>Functional Unit</p>	<p>The functional unit for the avoided GHG emissions is expressed as metric tons of CO₂e per mobile phone subscriber.</p>

Methodology

The total data savings and airtime savings on AT&T's network from the use of AT&T's Video Optimizer on a select number of apps were collated between 2012 and 2019 and used to calculate network and battery energy savings, respectively.

Network Savings:

- To calculate Network Savings, annual data savings on AT&T's network was multiplied by the respective year's energy intensity, to produce kWh savings between 2012 and 2019. The cumulative annual energy savings was then divided by AT&T's total mobility subscribers, to provide the energy savings per connection for 2019.
- Using ITU data, this factor was multiplied by the number of mobile broadband connections in the US and globally, to provide total kWh saved for both the US and globally. The ITU figures were adjusted using an assumed adoption rate of 100% in the US and 50% globally to reflect the use of the apps in the respective areas.
- kWh savings were converted into carbon savings by multiplying the US and global figures by the US eGRID electricity emissions factor and the IEA & BEIS global electricity emission factor respectively. These values were subsequently converted into gallons of gasoline using the EPA equivalency factors.

Battery Savings:

- To calculate device battery savings, 2019 cumulative annual airtime savings on AT&T's network was multiplied by the average power consumption of the GSM radio module of a mobile phone to produce the annual kWh savings. This kWh savings figure was subsequently divided by AT&T's total mobility subscribers, to calculate the kWh savings per mobile subscriber for 2019.
- Using ITU data, this factor was multiplied by the number of mobile broadband connections in US and globally, to provide total kWh saved for both the US and globally. The ITU figures were adjusted using an assumed adoption rate of 100% in the US and 50% globally to reflect the use of the apps in the respective areas.
- kWh savings were converted into carbon savings by multiplying the US and global figures by the US eGRID electricity emissions factor and the IEA & BEIS global electricity emission factor respectively. These values were subsequently converted into gallons of gasoline using the EPA equivalency factors.

<p>Key Assumptions</p>	<ul style="list-style-type: none"> • Assume 100% adoption rate for US and a 50% adoption rate for global subscriptions (based on subscriptions/number of users of the selected apps in both the US and globally). • Assume apps will be used on smartphones while using mobile or fixed broadband.
<p>Exclusions</p>	<p>No exclusions</p>
<p>Data Sources</p>	<ul style="list-style-type: none"> • AT&T Data Savings data from selected apps (2012-2019) • AT&T Airtime Savings data from selected apps (2012-2015, 2017) • EPA Equivalences (https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references) • Electricity emission factors (eGrid – https://www.epa.gov/energy/egrid) • IEA 2019 World Electricity Emission Factors • BEIS 2019 World Upstream Electricity Upstream Emission Factors (https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019) • ITU Statistics: Number of Fixed and Mobile Broadband Subscriptions (https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx) • Power Consumption of GSM radio module of a mobile phone (https://www.usenix.org/legacy/event/atc10/tech/full_papers/Carroll.pdf, https://arxiv.org/ftp/arxiv/papers/1312/1312.6740.pdf) • AT&T Domestic Broadband Connections and Mobility Subscribers (https://investors.att.com/~media/Files/A/ATT-IR/financial-reports/annual-reports/2019/complete-2019-annual-report.pdf)
<p>Results</p>	
<p>Carbon Abatement Factor</p>	<p>6.65 g CO₂e per mobile phone subscriber per year based on cumulative energy savings between 2012 and 2019.</p>



Endnotes

1. "Q2 2019 Global Video Index," Brightcove, June 10, 2020, <https://www.brightcove.com/en/video-index?cid=701100000038RrX&pid=70114000002Qtgh>
2. "Greenhouse Gas Equivalency Calculator," U.S. Environmental Protection Agency, August 16, 2019, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (Note, average eGRID electricity factors have been used rather than marginal AVERT electricity factors, this being a more conservative savings estimate)
3. "Mobile traffic by application category," Ericsson, November, 2019, <https://www.ericsson.com/en/mobility-report/reports/november-2019/mobile-traffic-by-application-category>
4. Ibid.
5. Ibid.
6. Ibid.