Mileage Reporting Options for Successful Road Usage Charging

Azuga Insight Report

azuga™
a Bridgestone Company

Background

As more road usage charging (a.k.a. pay-per-mile tax or mileage-based user fee) programs and research pilots launch across the country, it's important to consider the requirements of technology needed to bring these initiatives effectively and securely to scale. If a state or federal government is to implement road pricing legislation in an effort to fund the Federal Highway Trust Fund, the technological restrictions as well as the personal preferences of each individual in a large, widely varying population must be addressed.

Since the very first road usage charge (RUC) program launched in Oregon, Azuga has provided a quality, end-to-end solution for all services related to the management of RUC, including the provision of several mileage reporting options. Notably, Azuga has also completed the important work of field testing several mileage reporting options (MROs) from which motorists could choose. Above all options, the plug-n-play OBD II devices (e.g. the Azuga device) have proven to be the most versatile and efficient MRO available today.

Let's look at several of the MROs available today and how they could help manage a road usage charging program.

Onboard Telematics

These include the smart systems built into newer car models by the manufacturers themselves and the application programming interface (API) software solutions that access the data provided by these systems. Vehicle onboard telematics is also known as connected car systems and provides a variety of data insights from a car's computer, ranging from tire pressure to engine trouble codes.

Pros

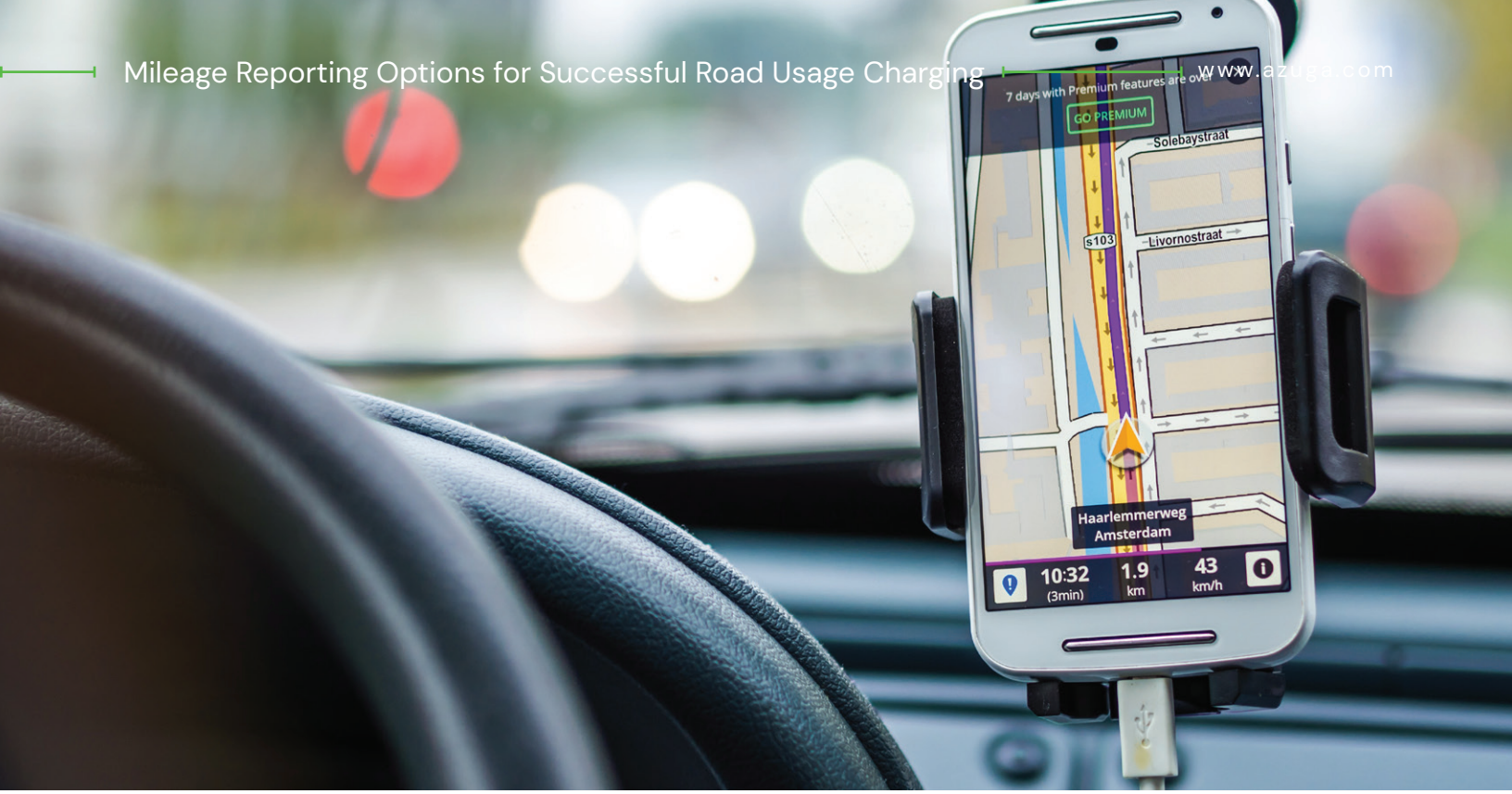
The biggest advantage of this MRO is the fact that it's already built in. Upon sign-up the vehicle owner simply authorizes mileage verification via the vehicle manufacturer's connected car system.

Cons

Most cars today do not have connected car systems, making this MRO applicable to a limited segment of the general population. Additionally, most vehicle manufacturers require a paid subscription for connected car systems and most people opt out or don't even know a subscription service is available. Even when manufacturers provide a free period of service, customers are still required to set up their account—a task many drivers fail to do, research shows. And, if a subscription expires, mileage recorded for mile fees is lost. Plus, some of these systems (at this time) are unable to discern mileage driven within boundaries (e.g. state borders) of a geo-specific program—a functionality key to cross-border road usage billing. Finally, mileage reporting from these systems requires software development efforts between two disparate parties. While completely feasible using modern API technology, integration efforts can be time consuming and may require ongoing maintenance.

Takeaway

This MRO is incredibly convenient and relevant to cars of the future and should be offered as one of a few options. By itself, this MRO is not able to meet the all the unique needs of a large-scale population. It must be offered as an alternative but cannot be relied upon as a sole solution.



Mobile phone apps

Yes, there are apps for road user charges. Using the GPS capability of a mobile phone, the app calculates miles driven. The app can also be paired with a small, bluetooth low-energy beacon placed in the vehicle.

Pros

Today, most people have a smartphone with them at all times and most smartphones are capable of accurate mileage collection because of GPS functionality. Operation costs are low and smartphone apps can be easily toggled on and off for privacy or other reasons. Increased efficiency can be achieved when a beacon (the size of a credit card) is used to signal to the vehicle owner's smartphone that he/she is in the proper vehicle and to start collecting mileage. Similarly, if the owner gets in someone else's vehicle, the mobile app will not be activated and avoid the collection of irrelevant miles.

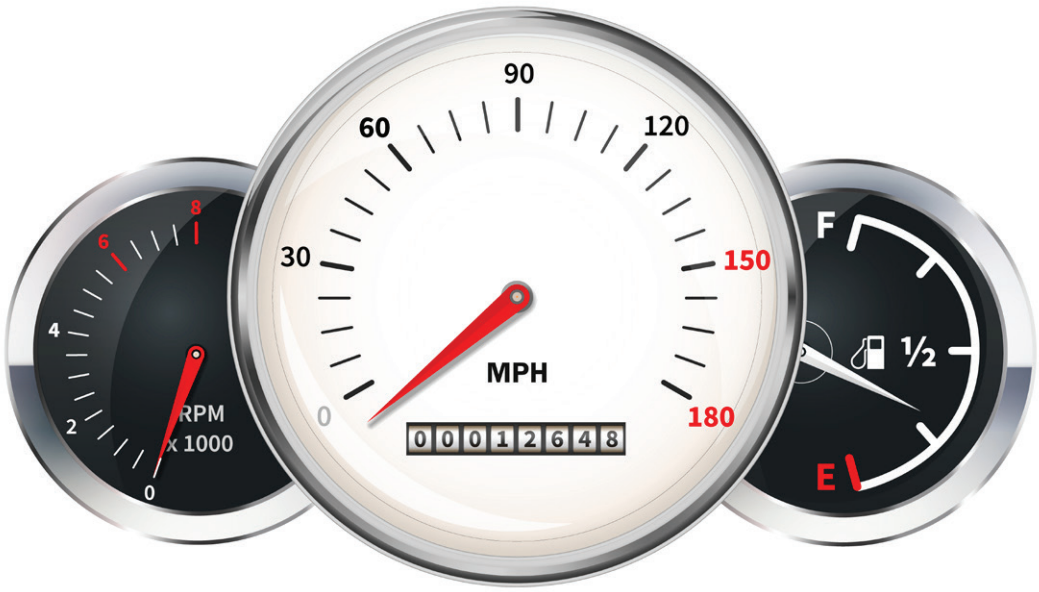
Cons

Unfortunately, depending on a variety of factors, this MRO can incur data charges and drain the battery. Apps without GPS capabilities also cannot differentiate miles driven within the program boundaries from miles driven outside these boundaries. Most of all, drivers may sometimes forget, lose, replace, or damage their phones or beacons, and miles driven in the meantime remain unreported. Plus, a personal smartphone cannot account for miles driven by someone else driving the vehicle without the presence of the vehicle owner.

Takeaway

Mobile apps using GPS capabilities solely for calculating miles driven have convenience and cost-efficiency, but absolutely no reliability. The opportunity for human error—including user fraud—is too high.

azuga™
a Bridgestone Company



Odometer image capture (OIC)

Smartphone apps are capable of collecting mileage from periodic photos of the vehicle's odometer taken by the owner's smartphone camera.

Pros

As already mentioned, most people have a smartphone on them at all times. OIC allows a vehicle owner to conveniently report mileage based on the vehicle odometer with a simple photo. This method does not require location-enablement, providing a sense of privacy and security for users. Additionally, modern fraud detection algorithms are continuously improving and can determine the authenticity of submitted odometer images—even determining whether an image from a different vehicle was fraudulently submitted.

Cons

Forgetfulness and procrastination of drivers to take pictures of their odometers is the most common challenge to this mileage collection option. And, as with other non-location based mileage collection methods, OIC requires additional paperwork to receive credit for miles driven outside of program boundaries. Of course this method lacks location information, so cannot be used to differentiate miles traveled outside a program zone.

Takeaway

Fraud detection software is continuously evolving but not yet perfect; however, OIC is a solid, low-fraud option for mileage collection. Many drivers may find comfort in the private, snap-n-go feel of this simple option.

Mileage permits

Vehicle owners may choose to purchase a permit to drive a flat total number of miles per billable period.

Pros

Permits provide the deepest level of privacy. Purchase is easy and remote.

Cons

Unsurprisingly, motorists' monthly average mileage varies month to month. This MRO is also one of the most inconvenient. Permit holders are required to periodically visit a recording station or fill out paperwork, and extra paperwork is required for any miles driven outside of the program boundaries. Drivers absorb the cost when they drive fewer miles than what is allowed on their permits and there is no efficient way for the state to recover funds when a motorist drives more miles than what is allowed.

Takeaway

Although an ideal option for the privacy-conscious driver, it is best for vehicles driven a consistent number of miles over a period of time. Barring any complications from mileage confirmation, permits are a secure and practical MRO.

azuga
a Bridgestone Company

Manual entry

A back-to-the-basics option that allows vehicle owners to report their mileage via paperwork or electronic means.

Pros

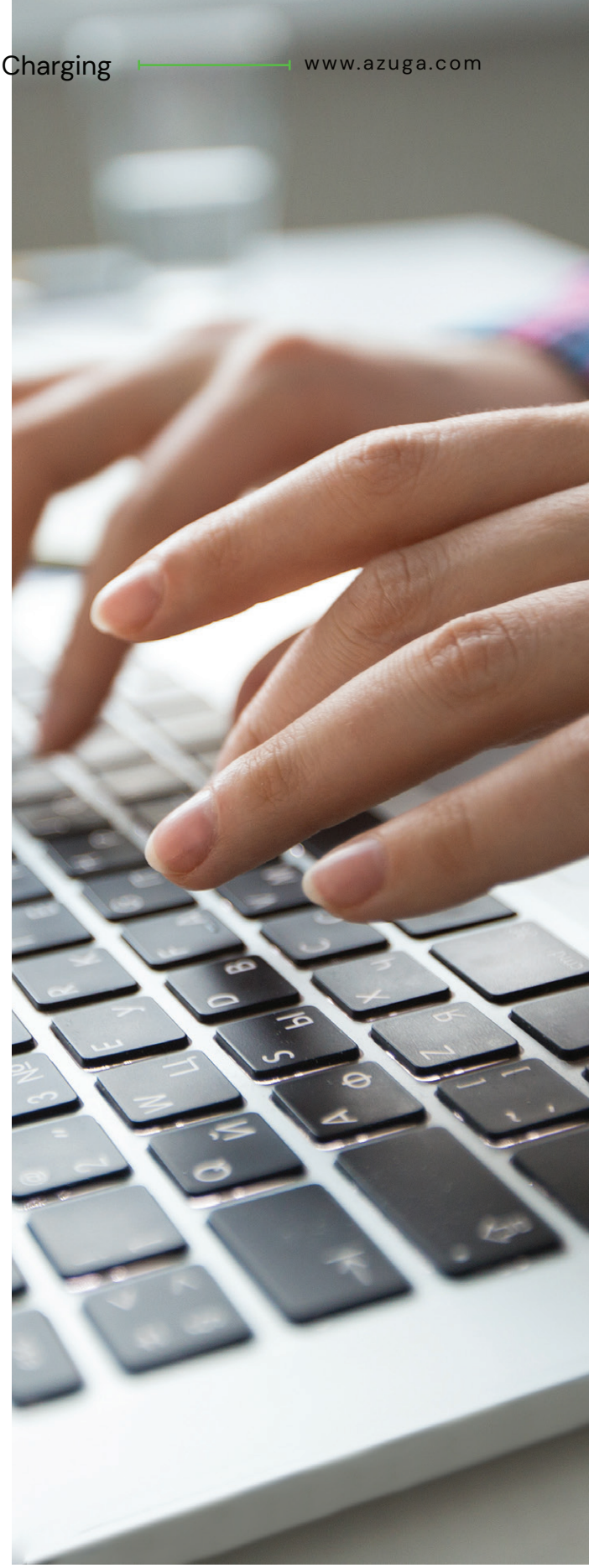
This simple method can provide a sense of privacy and security, as it requires only periodic reports. Some programs may allow manual entry reports to be self-certified and submitted via electronic means (under the penalty of law and subject to audit, just like annual tax filing) on a smartphone, tablet, or computer.

Cons

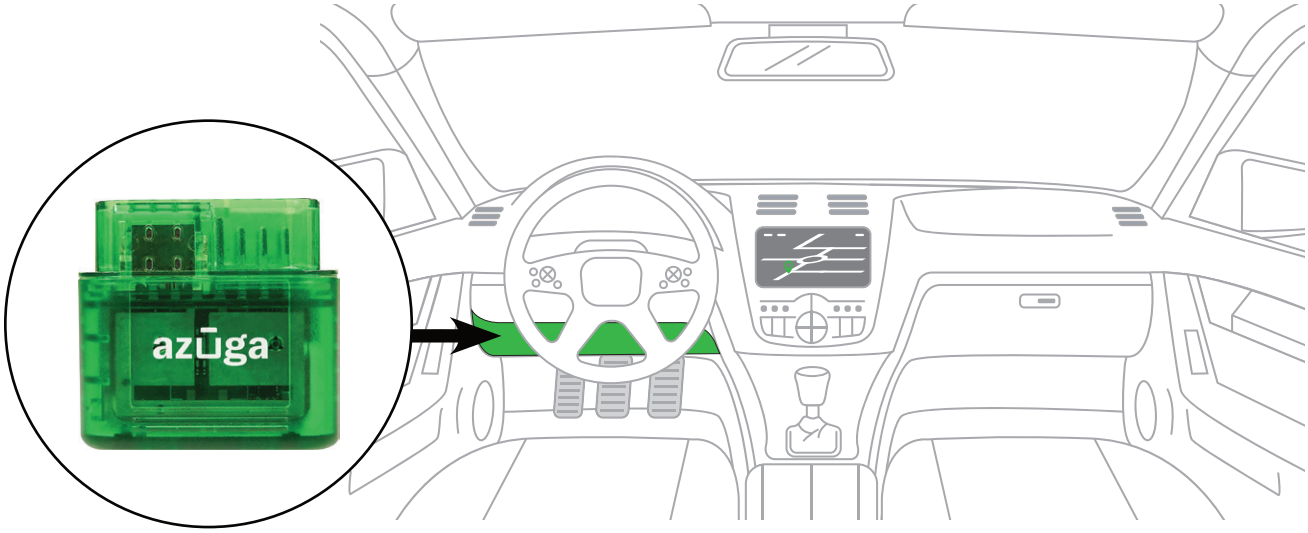
If electronic reporting systems are not available in a state program, miles must be reported via periodic visits to a recording station or with tedious paperwork. In general, all road user charges incurred over a predetermined period of time must be paid on a monthly or quarterly basis. If a person sells a vehicle without sending the final odometer reading, there is even more hassle of getting the Department of Motor Vehicles involved to retrieve the mileage.

Takeaway

For states like Hawaii where regular vehicle inspections are required, odometer reading reports are the easiest and most direct MRO—but only for people who prefer to pay road charges on a monthly or quarterly basis rather than seamlessly and automatically like other options.



azūga™ a Bridgestone Company



OBD II devices (e.g. Azuga device)

Onboard diagnostic (OBDII) devices plug in to most cars' diagnostic ports and immediately relay information from the car's native computer system.

Pros

Compatibility

- Most cars manufactured after 1996 are compatible with the OBDII device.

Convenience

- The OBDII device is installed in just a few seconds—simply plug it in and leave it. Mileage is verified quickly and remotely without you having to do anything else.

Reliability

- Software updates are quick, easy, and remote. Azuga utilizes a reputable cloud service to allow fast and reliable functionality on high economies of scale.

Accuracy

- Mileage reporting via this method is accurate and timely. As an added bonus, GPS-enabled devices can differentiate mileage types and easily subtract miles driven outside of a program's taxable boundaries. They also afford the ability to implement congestion based pricing and other local level road usage charge programs that require location information.

Value-add savings

- Enablement of value-added services is a major perk. For example, Azuga Insight provides users with—to name a few—engine diagnostic help, low battery voltage alerts, and remote emissions testing services. These features can help vehicle owners maintain the overall health of their vehicle, save money on costly repairs, help optimize fuel use, and monitor teenagers operating the family car.

Privacy and security

- As a third-party technology provider, Azuga keeps vehicle data secure and completely separate from the government. Azuga encrypts data, stores it on secure and reliable servers, destroys it on a periodic basis, and never shares it with government eyes without explicit permission from the vehicle owner. For anyone skeptical of location-enabled features, Azuga also offers a non-location device option.

Fraud protection

- Should someone intentionally or unintentionally tamper with the device, the technology provider (e.g. Azuga) and the vehicle owner will be notified immediately to take corrective action. Some vehicles even provide odometer readings via direct communication between the OBD device and the vehicle computer, circumventing any possibility of mileage fraud, and allowing for mileage true-up if the device is ever unplugged.

azūga™
a Bridgestone Company

OBD II devices (e.g. Azuga device)

Cons

Some cars do not have an OBD port and few others do not have a convenient OBD port location. In rare instances, technical difficulties may require a device replacement. On even rarer occasions, loss of cellular signal can prevent timely transmission of mileage information. Lastly, the operational cost is considerably higher than other mileage reporting options and the perceived loss of privacy (even with privacy protection laws) is a challenge.

Takeaway

The OBDII device offers the widest range of compatibility for a large-scale road usage charge program with few existing challenges. Furthermore, Azuga is partnered with the nation's leading OBDII device manufacturer, allowing speed to market and the ability to support the high-volume needs of a massive-scale program. But we also acknowledge the device is not compatible with all vehicle types nor personal preferences, so other options must be offered as safe alternatives. The device, in conjunction with a few other reporting options, can make any road user charge program efficient and effective. This is particularly true as more services become available—such as usage-based insurance for customized automobile coverage.

Conclusion

Many mileage reporting options (MROs) have been tested over the duration of multiple programs and there is no one-size-fits-all collection method. As you can see, each solution has its own benefits and isn't without drawbacks. Though, some solutions are far more effective than others.

Without a doubt, Azuga's OBD device option stands above the rest in versatility, efficiency, and accuracy. That's not to say it's the only feasible solution. A diverse population of unique individuals and varying vehicles must be served with a diverse set of solutions. Azuga's device has provided participants in road charging programs an easy and engaging experience, but the connected car systems and mobile app options are also essential for any large-scale operation.

To ensure privacy, security, and reliability in each mileage reporting option for everyday drivers as well as state governments, Azuga continues to research and develop verification methods and how each impacts the user experience. Our work is laying the foundation for road user charge programs across the country and will be invaluable as more programs are created for alternative transportation funding and transportation research.

Below, we've summarized specific qualities of several mileage verification methods we've meticulously tested. This is just the beginning. Azuga will bring into the future more innovations and advancements.

Chart 1 | Mileage Reporting Options (MROs) Comparison

MRO	Number of Vehicles Supported	Driver Involvement	Operation Cost	Accuracy of Data	Loss Potential
OBDII Device	High	Low	High	High	Low
Onboard Telematics	Low	Medium	Medium to High	High	Low
Mobile Apps (alone)	High	Medium	Medium	Low	Very High
Mobile Apps + Beacon	High	Medium	Medium	Low	High
Odometer Image Capture	High	High	Medium	Medium to High	Low
Manual Entry	High	Medium	Low	Medium to High	Low

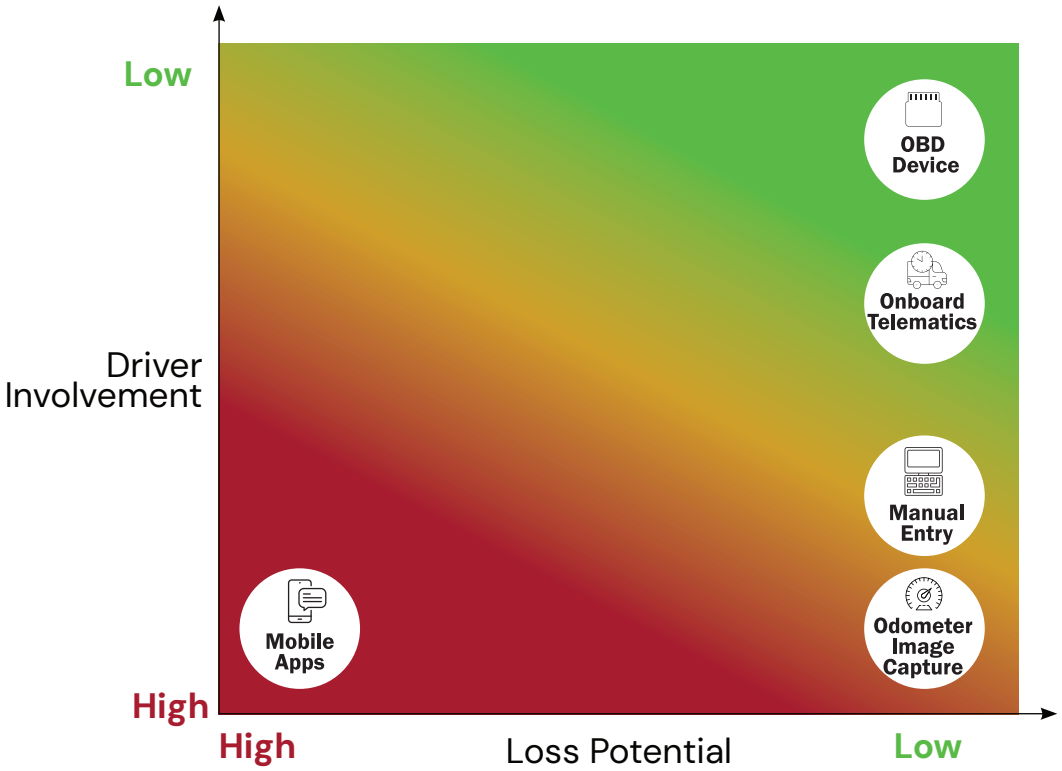


Table 1
Driver Involvement vs. Loss Potential

Driver Involvement is the level of effort expected on the behalf of the vehicle owner to successfully use the mileage reporting option.

Loss Potential is the possibility of losing mileage due to technological or human error, specifically as it relates to the mileage reporting option.

azuga a Bridgestone Company

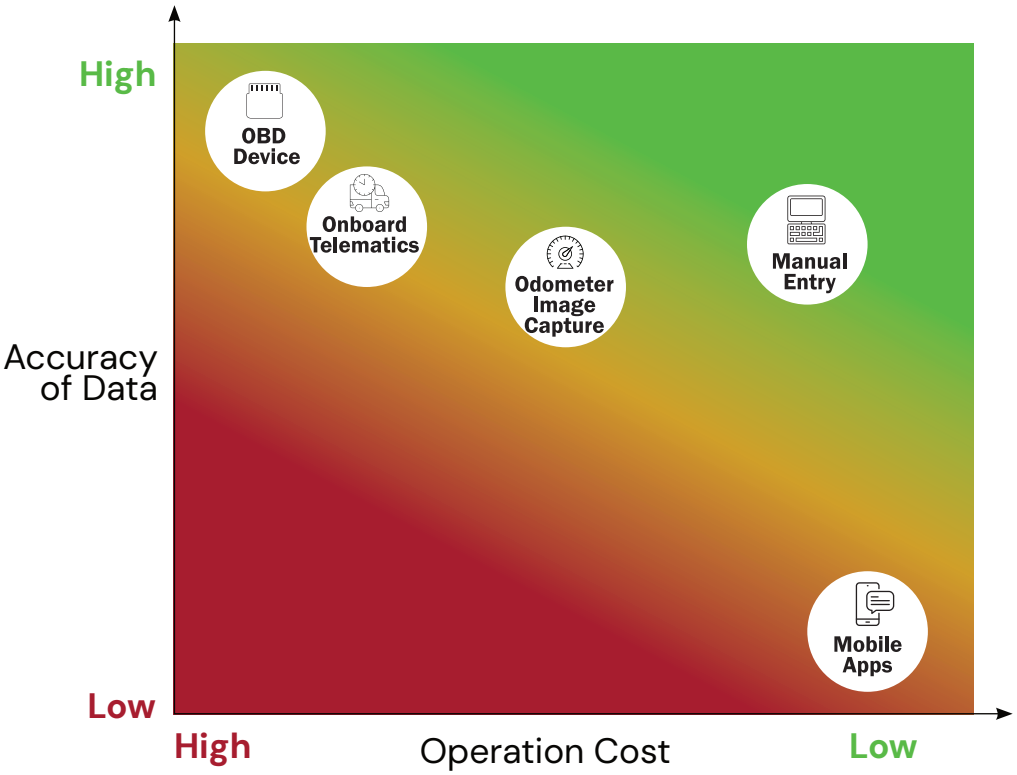


Table 2
Accuracy of Data vs. Operation Cost

Accuracy of Data is the correctness of the distance travelled (i.e. mileage) calculated by the mileage reporting option.

Operation Cost includes the expenses of operating the mileage reporting option.

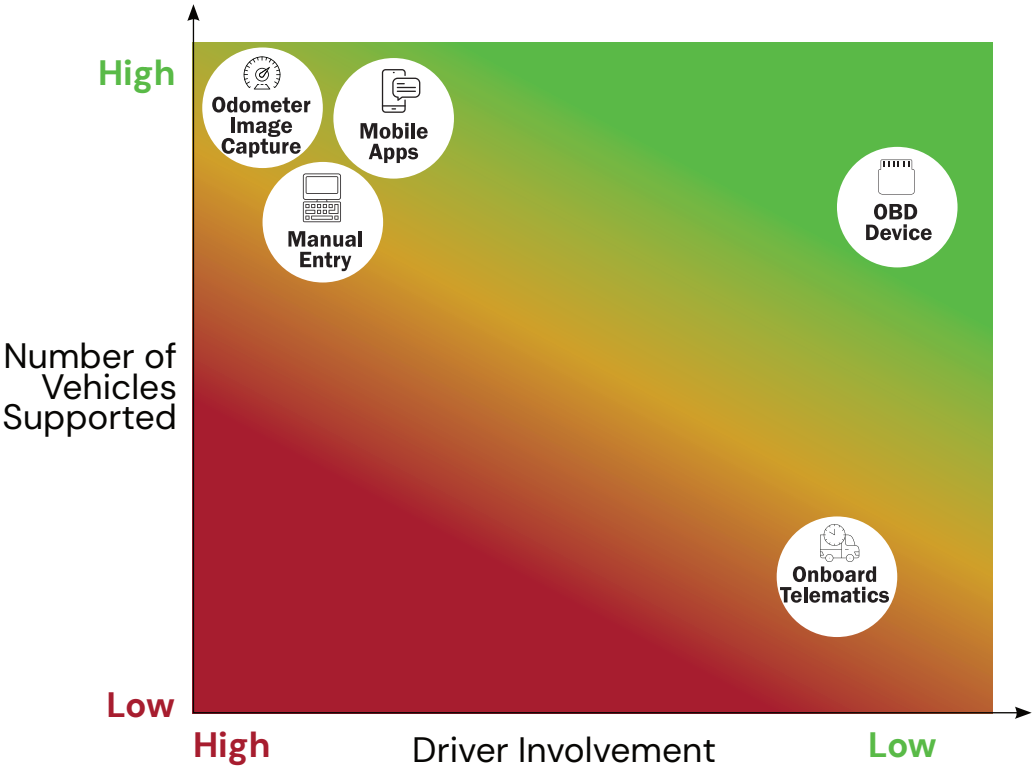


Table 3
Number of Vehicles Supported vs. Driver Involvement

Number of Vehicles Supported is the total number of operating vehicles the mileage reporting option can successfully support.

Driver Involvement is the level of effort expected on the behalf of the vehicle owner to successfully use the mileage reporting option.

azuga a Bridgestone Company

About Bridgestone

Nashville, Tennessee based Bridgestone Americas Tire Operations is the U.S. subsidiary of Bridgestone Corporation, the world's largest tire and rubber company offering a wide range of Bridgestone, Firestone and associate brand tires, BATO maintains wholesale and original equipment sales operations across a broad line of products, including passenger, light truck, commercial truck and bus, agricultural, motorcycle, kart and off-the-road tires.

Additional US subsidiaries include Bridgestone Retail Operations which operates the largest network of company-owned automotive service providers in the world – nearly 2,200 tire and vehicle service centers across the United States – including Firestone Complete Auto Care, Tires Plus, Wheelworks and Hibdon store locations. Bridgestone authorized dealers consist of independent tire retailers that are authorized to sell and service Bridgestone or Firestone products. BATO's Commercial Solutions Group also has an extensive dealer network that also includes Truck, Bus, Radial Division. In summary the Bridgestone network consists of approximately 5,400 service locations for tire, automotive and fleet solutions.

Below is a complete list of links to our products for Commercial, Retreads and Consumer tires.

Bridgestone Brand
Alenza, Blizzak, DriveGuard, Dueler, Ecopia, Potenza, Turanza
Bridgestone Consumer product
website: https://www.bridgestonetire.com/
Bridgestone Commercial product
website: https://commercial.bridgestone.com/en-us/index

Firestone Brand
All season, Champion, Destination, Firehawk, Transforce, WeatherGrip, Winterforce
Firestone Consumer product
website: https://www.firestonetire.com/
Firestone Commercial product
website: https://commercial.firestone.com/en-us/index

Bandag Retread
website: https://www.bandag.com/en-us/index

About Azuga

Azuga, a Bridgestone company, is a leading global connected vehicle platform, helping our customers turn data about vehicles and their use into intelligence that improves operations and safety while reducing costs and risk. Azuga provides reliable end-to-end solutions for commercial fleets, government agencies, insurance companies and automotive industry suppliers, encompassing hardware, the Azuga One platform, award-winning fleet applications and data analytics. Azuga is headquartered in Fremont, California.

Our award-winning Azuga Fleet solution is used by thousands of customers —from the small fleet of one or a few vehicles up to several thousand—and is lauded by our customers for its ease-of-use, robust features and affordable pricing.

Mileage Reporting Options for Successful Road Usage Charging

Fleet Care | azuga a Bridgestone Company

(888)-777-9718 www.azuga.com