January 2024

Digital Map with Integrated Toll Notifications and Account Recharge

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Digital Map with Integrated Toll Notifications and Account Recharge

ABSTRACT

Electronic toll booths that automatically debit toll charges from a prepaid account associated with a hardware tag are popular. However, having insufficient balance in the prepaid account can cause the user's journey to be interrupted, as the user needs to recharge the account before crossing a toll booth. This disclosure describes techniques that enable the management of electronic toll accounts from within a digital map or navigation application and provide an easy process for payment. The techniques include real-time balance checks and predictive functionality based on the user's location and route and can help ensure that users have sufficient funds to cover upcoming toll charges.

KEYWORDS

- Toll booth
- Electronic toll
- Toll account
- FASTag
- Digital wallet
- Digital map
- Predictive recharge
- Route guidance
- Balance update
- In-App payment

BACKGROUND

The implementation of electronic toll collection via hardware tags installed in vehicles eases traffic at toll booths. Users need to manually monitor and recharge their electronic toll accounts, which is both inconvenient and susceptible to human error. However, users may forget to maintain sufficient account balance on such hardware tags. Insufficient funds can cause the user's account and the linked hardware tag to be blacklisted and disrupt seamless toll payments. Insufficient balance on the hardware tag is a common source of worry for users. Additionally, resolving a blacklisted account by contacting customer service and/or recharging the account and waiting for a duration before the hardware tag can be a time-consuming task. Further, in case of some hardware tags, timely balance notifications are not available, thus preventing users from taking timely action to add money to the account.

Digital payment apps provide basic transaction functionalities to recharge accounts connected to hardware tags used for toll. However, these apps lack features to manage electronic toll accounts and do not offer real-time balance alerts. Also, digital payment apps and toll accounts do not integrate with digital map or navigation tools, e.g., to provide real-time balance updates when a user is approaching a toll booth.

DESCRIPTION

This disclosure describes techniques that enable the management of electronic toll accounts from within a digital map or navigation application and provide an easy process for payment. The techniques include real-time balance checks and predictive functionality based on the user's location and route and can help ensure that users have sufficient funds to cover upcoming toll charges.

With user permission to access location data and navigation guidance information from a

digital map or navigation app, as the user is driving or riding a vehicle, upcoming toll charges are automatically inferred (e.g., based on toll information available from the navigation app, prior toll transactions near the location, etc.). The toll amount can be estimated based on the vehicle type and location. The user can selectively enable or disable permission to access their location and/or their electronic toll account.

With user permission, the electronic toll account is accessed to determine the available balance. As the user nears a toll booth The navigation interface is updated to provide information about the upcoming toll charges and the balance available in the electronic toll account. If the balance is below a threshold (e.g., below the upcoming toll, or additional tolls along the user's path), an alert is provided to the user. Integration of these features within the navigation app allows users to stay within the navigation flow, rather than having to open separate apps to check toll charges, check the balance available, or recharge their electronic toll account.

Optionally, a voice-interface can be provided via a virtual assistant within the navigation application or other apps on the user device. The user can issue voice commands to recharge their electronic toll account thus enjoying an uninterrupted navigation and payment experience. The described techniques can provide end-to-end toll management with calculation of the cumulative toll for an entire journey and a convenient option to recharge the toll account to ensure that the balance is greater than the total amount needed.

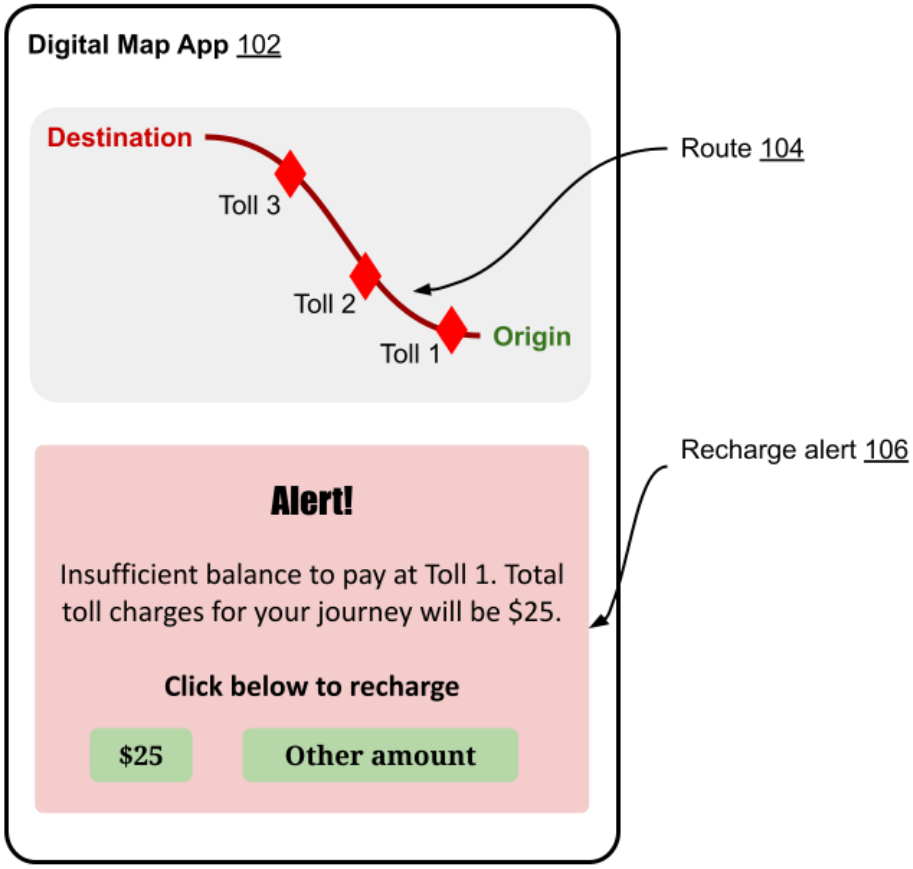

Fig. 1: Digital map with integrated toll notifications and account recharge

Fig. 1 illustrates a digital map application (102) with integrated toll notifications and account recharge features, per techniques of this disclosure. With user permission, the app can access the user's electronic toll accounts to check balance and to recharge the account. Also, with user permission, the app can use the current location and planned route to automatically generate alerts for the user.

In the example of Fig. 1, the user's planned route (104) is displayed. As seen in Fig. 1, between the origin and the destination, there are three toll booths (Toll 1, Toll 2, and Toll 3). Since the route has tolls, the user's electronic account is checked. In the example of Fig. 1, the user has insufficient balance in their toll account. Based on this determination, an alert (106) is

displayed to the user, indicating that there is insufficient balance to pay at the first toll booth. The alert also includes the total toll charges expected for the entire route and a prompt for the user to conveniently recharge their account directly for the specified amount ($25) or any other amount).

In this manner, the described techniques provide users a seamless travel experience, eliminating balance anxiety, providing timely information, a

While the foregoing description refers to digital maps and electronic toll booths, the described features can be utilized in other contexts. For example, the real-time balance check and associated functionality can be implemented, e.g., as application programming interfaces (APIs) that can be accessed by any authorized application. The described techniques can also support other types of travel, e.g., travel via public transit and recharges/payments to public transit fare accounts. The described techniques can also be applied to prepaid accounts in any other context. Voice-activated recharge and balance alert features can be provided for any prepaid account.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's vehicle, a user's prepaid accounts such as electronic toll accounts, a user's navigation app and current journey, a user's preferences, or a user's current location), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is

used, and what information is provided to the user.

CONCLUSION

This disclosure describes techniques that enable the management of electronic toll accounts from within a digital map or navigation application and provide an easy process for payment. The techniques include real-time balance checks and predictive functionality based on the user's location and route and can help ensure that users have sufficient funds to cover upcoming toll charges.