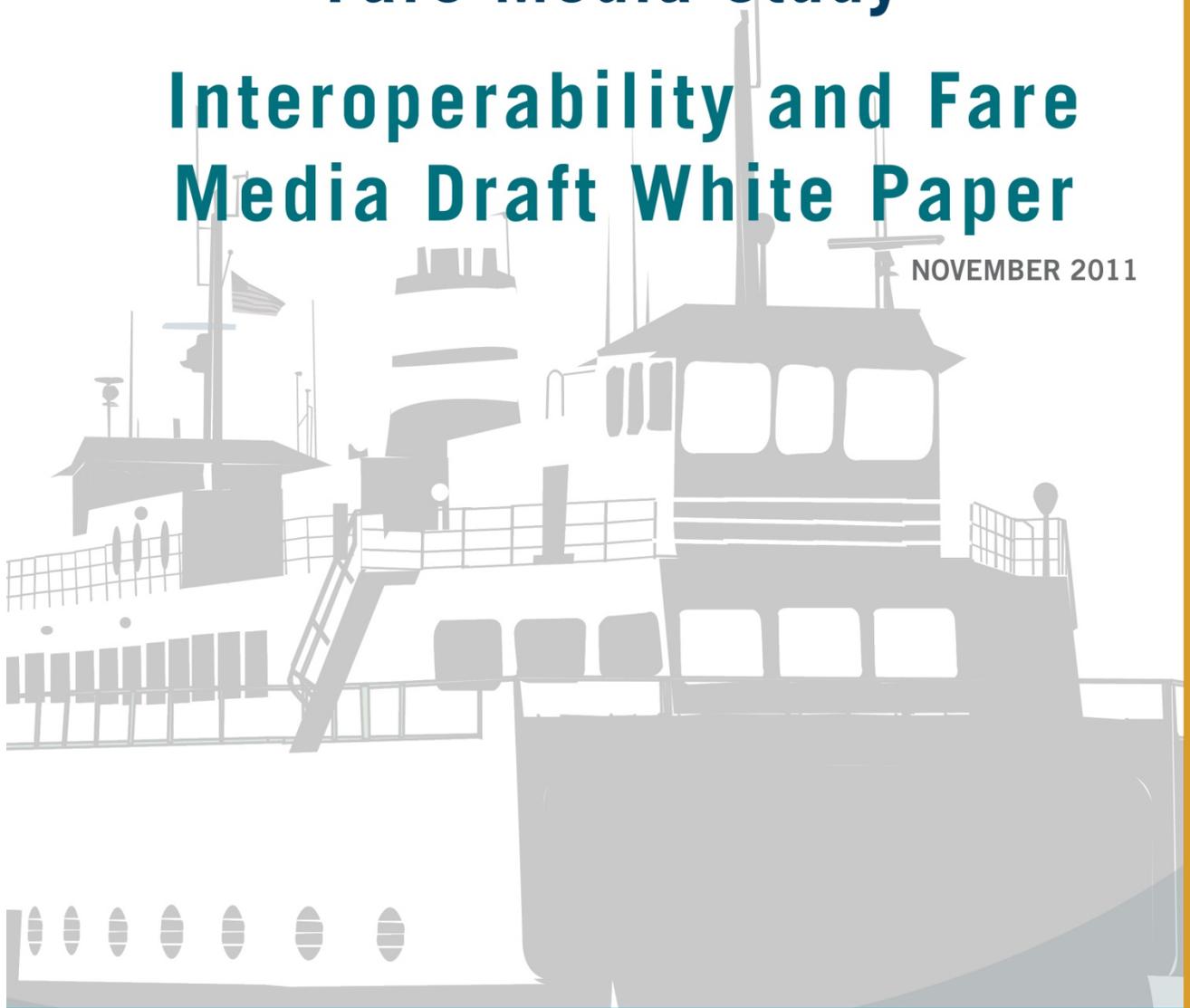


WASHINGTON STATE LEGISLATURE
JOINT TRANSPORTATION COMMITTEE

WASHINGTON STATE FERRIES
Fare Media Study

**Interoperability and Fare
Media Draft White Paper**

NOVEMBER 2011



Fare Media ■ Fare Structure ■ Interoperability


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EXECUTIVE SUMMARY

The 2011 legislature directed the Joint Transportation Committee (JTC) to conduct a study of the Washington State Ferry (WSF) fares that recommends the most appropriate fare media for use with the reservation system and the implementation of demand management pricing and interoperability with other payment methods.

A companion *Situation Assessment White Paper* October 2011 discusses the existing fare structure, fare media, and interoperability; and WSF's reservation and demand management pricing programs. The next white paper will be on the fare structure.

WSF Customers

A central focus of this study is the WSF customer whose satisfaction and ridership is affected by fare media, interoperability, and fare structure. WSF customers are segmented, with one of the key differences being whether customers walk-on or drive on the vessel. The difference reflects the fact that WSF is unique in providing two distinct transportation services – a marine highway and a transit system – and affects the type of fare media that can be made available to customers.

- **Walk-on Customers** Available fare media are *Wave2Go*/EFS (electronic fare system) and ORCA. *Good To Go!* is a vehicle, not a transit product, and would not, as a practical matter, be used to by walk-on customers. Fare products available to walk-on customers are single fare (adult, senior, youth) and monthly passes, both which of are supported by *Wave2Go*/EFS and ORCA, and multi-ride cards currently supported by *Wave2Go*/EFS only.
- **Drive-on Customers:** *Wave2Go*/EFS and ORCA are used to collect vehicle fares and passenger fares for drive-on customers (ORCA functionality for vehicle booths is expected to be implemented shortly). *Good To Go!* could be deployed to support the marine highway aspect of WSF's service. Fare products currently available to drive-on customers include all of the walk-on customer products for passengers in the vehicle. For the driver and the vehicle, the available fare products are single vehicle or motorcycle (adult or senior) supported by *Wave2Go*/EFS and available through ORCA by the end of 2011, and multi-ride cards available only through *Wave2Go*/EFS.

WSF's current fare structure is complex, especially when compared to highway tolls. The fare structure includes base rates; discounts for seniors, youth, frequent passengers, and small vehicles; and surcharges for summer season on single vehicle fares only, fuel, and capital.

Interoperability Options

This white paper identifies four options to improve interoperability among three systems currently used by WSF - *Wave2Go*, ORCA, and commercial accounts - and with *Good To Go!*, the Washington State Department of Transportation's (WSDOT) highway tolling system which is not currently in use at WSF terminals. The options are not mutually exclusive.

Options 1, 2, and 4 could be implemented with the existing fare products and fare structure. Option 3 would require that the fare structure for vehicles be simplified to something that is more akin to the state highway tolls.

Option	Interoperability	Fare Media Impacts
1. ORCA Stored Ride Feature	Increases interoperability between <i>Wave2Go!</i> and ORCA	ORCA stores multi-ride products in addition to single fare and monthly passenger passes Commercial accounts remain separate
2. <i>Good To Go!</i> at Attended Booths	<i>Good To Go!</i> implemented as a peripheral to <i>Wave2Go</i> Integration with <i>Wave2Go</i> system required	Tollbooth staff calculates fares and charges to <i>Good To Go!</i> account Commercial accounts remain separate
3. <i>Good To Go!</i> at Unattended¹ Toll Collection Lanes	<i>Good To Go!</i> implemented as a separate stand-alone system No integration with <i>Wave2Go</i> system required	Fare products and fare structure changes required Vehicle fares calculated based only on vehicle length, determined electronically in unattended tollbooth lanes Commercial accounts remain separate
4. Account-based WSF System	Major upgrade or replacement of <i>Wave2Go</i> <i>Good To Go!</i> and ORCA used as an identifier The amount to be paid deducted from customers <i>Good To Go!</i> account or from stored value on ORCA card.	No changes required to fare products or fare structure Computed with central logic Commercial accounts could be integrated Establish account to pre-purchase discounted fare products

Preliminary Impacts Assessment

Each of the options and the current system are assessed in four categories: fare media, fare structure, technology and infrastructure requirements, and costs.

Option1. Implement ORCA Stored Ride. This option provides the least interoperability, requires no changes in the existing fare structure, requires minimal infrastructure and technology changes, and is relatively low cost. The option does not support vehicle time of day pricing, does not support future interoperability/emerging technologies, and will have no impact on the vehicle reservation system. The primary advantage of this option is that it allows customers to reduce the number of fare media that they have to have for WSF travel.

¹ Tollbooths would be unattended for the purposes of toll determination and collection. Booths may have to be attended for security or other reasons. That has not yet been determined.

Option 2. Implement Good to Go! with Attended Booths. This option improves interoperability significantly, requires moderate changes to the fare structure affecting primarily the use of vehicle and passenger multi-ride cards, has moderate technology requirements for transponder readers at terminals and a back-end interface with *Good To Go!*, and has initial capital costs of \$2.0 to \$5.0 million. This option has the same operations costs as now and would not reduce the level of future investment needed in a replacement or upgrade for *Wave2Go/EFS*.

Option 3. Implement Good To Go! with Unattended Booths. This option improves interoperability but would limit the drive-on customers to using *Good To Go!*. It would require significant fare changes for drive-on customers and significant technology and infrastructure modifications. The capital cost is estimated at \$5 to \$8 million, but would significantly reduce or eliminate the need for future investments in a stand-alone *Wave2Go/EFS* system because vehicle customer fare media would migrate to *Good To Go!*. Walk-on customer fare collection is not as complex and would not require the same level of investment in *Wave2Go/EFS*.

Option 4. Account-Based WSF System. This option would improve interoperability with any fare media being used as payment for either walk-on or drive-on customers. It could be implemented without changing the fare structure. The account-based WSF system would require significant technology and infrastructure changes, but would leverage the investment being made in the WSF vehicle reservation system. It would cost more than \$8 million to implement and could reduce or eliminate the investment in future *Wave2Go/EFS* system replacement.

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INTEROPERABILITY AND FARE MEDIA WHITE PAPER

INTRODUCTION

The 2011 legislature directed the Joint Transportation Committee (JTC) to conduct a study of the Washington State Ferry (WSF) fares that recommends the most appropriate fare media for use with the reservation system and the implementation of demand management pricing and interoperability with other payment methods. The study is to include direct collaboration with members of the Washington State Transportation Commission (WSTC) (ESHB 1175, Section 204 (1)); (Chapter 367, 2011 Laws, PV).

The following definitions are used throughout this study:

Interoperability: Degree to which system accepts fare media of other systems and vice versa.

Fare Media: The products that are accepted for payment.

Fare Structure: The structure and policies setting the fares and to whom they are charged.

A *Situation Assessment White Paper* October 2011 was the first white paper prepared as part of this study. It includes discussions of the WSF system and its travel sheds; of WSF ridership and customers; the existing fare structure, fare media and interoperability; and the reservation and demand management pricing programs that need to be accommodated by WSF's fare structure, fare media, and interoperability.

This *Interoperability and Fare Media White Paper* is the second of three white papers to be developed as part of this study. The third white paper will deal with fare structure.

The Washington State Department of Transportation (WSDOT) and WSF has made significant investments in electronic payment technologies. As described in the *Situation Assessment White Paper*, WSF has implemented a *Wave2Go* electronic fare system (EFS), is a participant in the seven-agency ORCA smart card program, and is in the process of implementing a new reservation system. WSDOT has made significant investments in the *Good To Go!* highway tolling program, including the development of a statewide customer service center (CSC) that integrates *Good To Go!* systems on the Tacoma Narrows Bridge, SR 167 and soon SR 520 into a single back-office customer and account management system.

WSF Customers – Driving-On and Walking-On

A central focus of this study is the WSF customer. Fare media, interoperability, fare structure, and the introduction of new programs such as reservations and demand management pricing are intertwined and affect the customer experience, satisfaction, and ultimately WSF's ridership.

As described in the *Situation Assessment White Paper* WSF customers are segmented. One of the key differences among customers is how they board the



vessel – whether they are walking on or driving on. This difference reflects the fact that WSF is unique in that it provides two distinct transportation services– a marine highway and a transit system. This difference also affects the type of fare media that can be made available to these customers.

- **Walk-on customers.** Walk-on customers use WSF as a transit system. The available fare media are currently *Wave2Go/EFS* and ORCA. The highway tolling system *Good To Go!* is not a transit product and cannot, as a practical matter, be used to support walk-on customers.
- **Drive-on customers.** *Good To Go!* could be deployed to support the marine highway aspect of WSF’s service. The transit products *Wave2Go/EFS* and ORCA are also used to collect vehicle fares and passenger fares from drive-on customers.

Fare Products Currently Available

As described in the *Draft Situation Assessment* WSF customers have the following fare products available to them:

- **Walk-On Customers and Passengers in Vehicles (other than the driver).** Available fare products are and the fare media that can be used to pay for them are:

Fare Product	Fare Media	Fare Product	Fare Media
Single – adult, youth, or senior	<i>Wave2Go/EFS</i> ORCA	Monthly Pass	<i>Wave2Go/EFS</i> ORCA
		Multi-ride Card	<i>Wave2Go/EFS</i>

- **Vehicle and Vehicle Driver**

Fare Product	Fare Media	Fare Product	Fare Media
Single vehicle or motorcycle – adult or senior	<i>Wave2Go/EFS</i> ORCA (by end of 2011)	Multi-ride Card	<i>Wave2Go/EFS</i>
Commercial accounts	Commercial account payments		

Fare Structure

The *Draft Situation Assessment* discusses WSF’s fare structure, which by comparison with tolls charged on the state highways is complex. The fare structure includes base rates; discounts for seniors, youth, frequent passengers and small vehicles; and surcharges for summer season on single vehicle fares only, fuel, and capital.

Interoperability Options

This white paper identifies four options to improve interoperability among three systems currently used by WSF - *Wave2Go*, ORCA, and commercial accounts - and with *Good To Go!*. The options are not mutually exclusive.

1. ORCA Stored Ride Feature
2. *Good To Go!* at Attended Vehicle Tollbooths

3. *Good To Go!* at Unattended Vehicle Tollbooths
4. New Account-Based WSF System

Options 1, 2 and 4 could be implemented with the existing fare products and fare structure. Option 3 would require that the fare structure for vehicles be simplified to something that is more akin to the state highway tolls.

SECTION I. EXISTING SYSTEMS AND EMERGING TECHNOLOGIES

Existing Fare Payment Systems

The *Situation Assessment White Paper* discusses in detail four systems that are, or could be, used to pay for travel on Washington State Ferries (WSF). Three of these are in operation now including:

1. **Wave2Go.** This system, also known as the “Electronic Fare System” or “EFS”, is a WSF-specific fare payment system used for both walk-on and vehicle/passenger fare payment. The system provides single ride payment, multi-ride cards, monthly passes, and revalue cards for full fare passengers. *Wave2Go* also provides other functions such as the collection of WSF traffic statistics and vehicle/passenger counts.
2. **ORCA (One Regional Card for All).** ORCA is the regional smart card system used by seven public transportation agencies, including WSF, in the Central Puget Sound area. WSF accepts ORCA for full fare passengers and monthly passes and will soon allow customers to purchase any *Wave2Go* single-ride fares with their ORCA E-purse. ORCA is not accepted for multi-rides (this function is currently only available through *Wave2Go*); however, the ORCA system can provide this function if enabled.²
3. **Commercial Accounts.** This system permits certain registered commercial customers to use WSF services and be post-billed for travel taken.

The fourth is *Good To Go!*, the State tolling program that provides toll systems on the Tacoma Narrows Bridge, SR 167 (HOT lanes), and soon on SR 520, as well as a statewide customer service center (CSC) that centralizes customer service and payment account services for all of these toll facilities.

Both the *Wave2Go* and Commercial Account systems utilize printed bar code technology for ticket validation. Scanners are used in the seller booths, at turnstiles, and by WSF employees (handheld units) to scan single, monthly passes and multi-ride WSF products. WSF issues and cancels tickets based on reading the bar code – all of the data associated with the ticket resides within the electronic fare system computers.

Good To Go! utilizes toll transponders and vehicle license plates as identifiers. This is similar to the electronic fare system where all of the data is maintained in a central computer system and account, with the transponder or license plate reader referencing that account.

ORCA uses contactless or proximity-card functionality where all of the data and permissions to ride reside electronically on the card itself. The ORCA readers (available on turnstiles, at seller booths, and in handheld devices) read and write to the card to validate a fare and update the value remaining on the

² It should be noted that ORCA can hold vehicle/driver stored rides or passenger stored rides, but not both at the same time. As well, multiple rides cannot be deducted from a single ORCA card, meaning that if there were multiple passengers in the vehicle the driver would have to hand over a group of cards.

card. The primary difference between ORCA and the other systems is that all of the governing data is stored on the card (medium) itself, whereas in both *Wave2Go* and *Good To Go!* the medium is simply an identification device that references a central account.

Vehicle Reservation System

The new vehicle reservation system under development at WSF will affect the fare payment process because some, but not all, customers will be required to pay a deposit towards their fare in order to make a reservation. The reservation system will be a user account-based system that will run parallel to *Wave2Go*/EFS. Payment of deposits for reservations (when required) will occur separately from fare transactions. The interoperability and fare media options must allow for these deposits.

1. Reservations with Deposits

In order to make a reservation, customers who do not have an account will be required to pay a deposit – this transaction will occur online or via phone with the method of payment being a credit card. Functionally, WSF will sell the customer a ‘reservation deposit’ product, and the customer will print a confirmation with barcode that can be scanned at the terminal. This deposit product and barcode will be separate from the customer’s *Wave2Go* ticket.

For customers coming to the toll booth with a reservation with a deposit, the ticket seller must identify that the reservation is valid (customer provides confirmation barcode or ticket seller needs to look it up in the reservation system), and the deposit amount paid is identified to the ticket seller. The ticket seller computes the correct fare to be paid (function of route, vehicle classification, passenger type, numbers of passengers, etc.), and sells the appropriate tickets from the *Wave2Go* ticketing system (note: there will be an additional set of single ticket vehicle products created within *Wave2Go* that are equivalent to current products and priced at the stated prices minus the deposit amount).

When a customer has a valid reservation and has paid a deposit, the ticket seller will use the ‘reservation deposit’ product (that has accounted for the payment of a deposit) plus any applicable passenger fare products. Customers who have paid a deposit for their reservation cannot use a vehicle multi-ride ticket to pay for travel because a multi-ride ticket is a prepaid fare.

2. Accounts Customers – No Reservation Deposit

Anyone will be able to establish a reservations account with WSF. WSF is in the process of developing the business policies around how customers create and maintain these accounts (i.e. who’s eligible, how do customers maintain the account, under what circumstances would a customer’s account be changed to a deposit-required account). At this point, it is anticipated that to continue to receive the discounts they are now getting, commercial account holders, vanpool/carpools, and vehicle multi-ride product customers will be required to establish a reservation account for use when traveling with a reservation. A reservation account will store payment information. Customers with these special account types would not be required to pay a deposit to make a reservation. Instead, they must agree that they’ll be charged the deposit amount (using the payment information stored with their account) if they do not show up to redeem their reservation and have not canceled or changed it in advance.

For these customers, the process by which the fare is paid at the terminal is similar to that of reservation customers with deposits, with the exception that this group of customers will be permitted to pay with vehicle multi-ride cards and commercial account cards in addition to vehicle single-ride products.

Emerging Payment Technologies

There are two emerging payment media that may warrant consideration in any discussion regarding payment systems upgrades and improvements.

The first of these is contactless or proximity “open payment” cards issued by financial networks including VISA, MasterCard and American Express (branded PayWave, PayPass and Express Pay respectively). These are processed like any other credit card, but do not need to be swiped; like ORCA they can simply be brought to within a few inches of a reader. Open payment cards do not store products such as rides, so are simply considered another payment mechanism (like a regular credit card) at the booth or other purchase point.

The second of these is cell phones which, in the payment world can act:

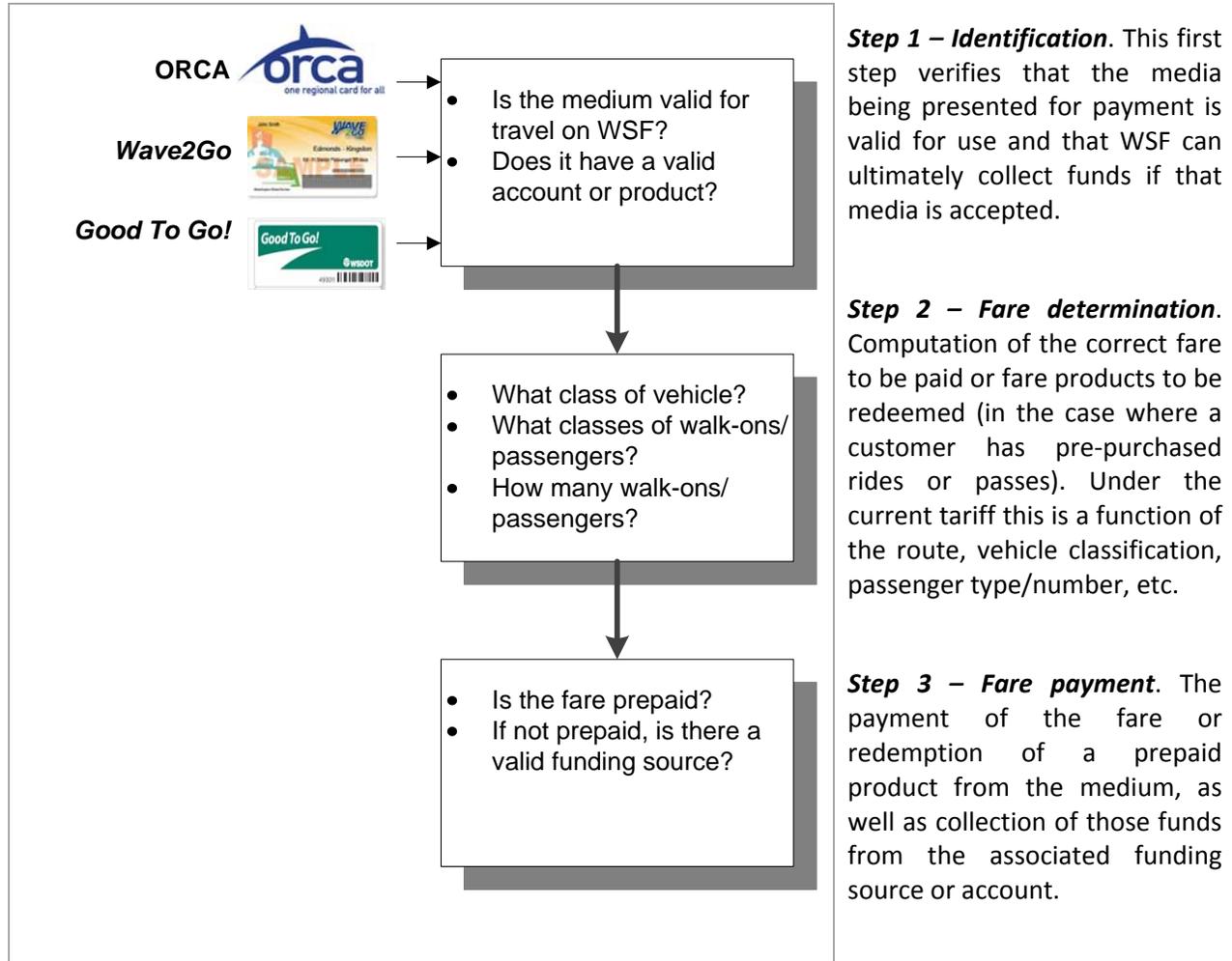
1. As a means of presenting a bar code. This functionality is becoming increasingly available in the airline world where a bar code image is sent to the phone and can be read by a standard scanner.
2. As a near-field communications device. Next generation cell phones are increasingly being equipped with “near field communications” technology which is basically an electronic chip embedded in the phone that acts like a contactless or proximity card. The chip can be programmed to look like a transit smart card (e.g. like the ORCA card), can be programmed to look like an open payment VISA, MasterCard or American Express contactless card, or can be programmed as a loyalty or other program card.

Implementing some or all of these new technologies should not impact overall system interoperability, but should be considered in any future investments in systems upgrades.

SECTION II. FARE PAYMENT PROCESS

General Process

The process by which a fare is paid can be broken down into three key steps:



In the case of one-time cash or credit card payments, all three of these steps occur at the time of travel and are processed through the *Wave2Go* system. In the case where a customer purchases a *Wave2Go* ticket in advance, funds collection occurs in advance of travel by as much as 90 days (i.e. for the multi-ride tickets). Similarly the new reservations system would collect funds in advance of travel occurring. Funds for travel using commercial accounts are collected post-travel through a billing arrangement.

From the perspective of WSF, ORCA and *Good To Go!* would operate somewhat differently in that the actual funds paid by the customer are collected and held by an external entity. In the case of ORCA, funds are maintained in a series of regional accounts managed by Sound Transit. Funds associated with WSF passes are transferred to WSF (to the State) within a few days of the sale of the pass. Funds associated with stored value transactions, however, are not transferred to WSF until such time as the customer travels.

Funds maintained in *Good To Go!* are held by WSDOT but not directly by WSF. Depending on State finance and audit policies, funds could either be transferred to WSF after travel has occurred (which may take a few days to a few weeks), or accounting records could be created attributing such funds to WSF. In either case, this could potentially impact current levels of WSF-specific pre-payment if customers shift from WSF products and media to these other systems.

System-specific Fare Payment Processes

Although all of the identified fare payment systems follow the three general steps noted above, there are some differences and nuances between them that need to be considered when developing interoperability options. The tables on the following pages highlight these.

Table 1: Comparison of Identification Methods

	<i>Wave2Go</i>	ORCA	Commercial Accounts	<i>Good To Go!</i>
Physical Fare Media	Printed barcode ticket	Contactless smart card (proximity type)	Printed barcode card	RFID tag (various formats) or License plate
Method of reading	Barcode scanner: <ul style="list-style-type: none"> Scanner at turnstile Scanner in booth Portable handheld scanner 	Smart card reader: <ul style="list-style-type: none"> Reader on turnstile Reader in booth Portable handheld reader 	Barcode scanner: <ul style="list-style-type: none"> Scanner in booth 	RFID tag via overhead antenna(s), and roadside reader/controller License plate via overhead camera(s)
Identification and validity confirmation	If ticket purchased at time of commitment to board, validity is inherent to the associated transaction If ticket pre-purchased: <ul style="list-style-type: none"> Status, route, expiry, vehicle and/or person characteristics verified by attendant Status, route and expiry verified by turnstile EFS for walk-ons at certain locations. Also a check that the ticket has not been used previously.	Status and balance (if applicable) verified between ORCA reader and ORCA card (all pertinent data stored on card)	Ticket checked against valid commercial accounts	Status of RFID tag / account checked by <i>Good To Go!</i> system. Note: The status check is that account or individual tag not suspended or cancelled. No validity check for license plate when vehicle passes. Subsequent determination of plate characters, vehicle registration lookup, and owner address confirmation subject to “leakage” at each step.

Table 2: Comparison of Fare Determination Methods

	<i>Wave2Go</i>	ORCA	Commercial Accounts	<i>Good To Go!</i>
Fare validity	Walk-ons Vehicle/driver Vehicle passengers	Walk-ons Vehicle/driver Vehicle passengers	Walk-ons Vehicle/driver Vehicle passengers	Vehicles
Basis for fare determination	Vehicle and/or person characteristics: <ul style="list-style-type: none"> route, day, vehicle size full fare or concession passenger classification 	Person and fare product: <ul style="list-style-type: none"> Full or concession fare categories Fare products and transfers accepted per individual agency policy (there are no agreements that affect WSF currently) 	Vehicle and/or person characteristics: <ul style="list-style-type: none"> route, day, vehicle size full fare or concession passenger classification 	Varies by facility Parameters used are number of axles, time of day, level of congestion, and/or method of identification or payment.
Validation method	Prepaid passes or rides validated by electronic fare system	Prepaid passes, prepaid rides, or stored value deduction validated by ORCA reader	Prepaid passes or rides validated by electronic fare system	Validated by <i>Good To Go!</i> local equipment

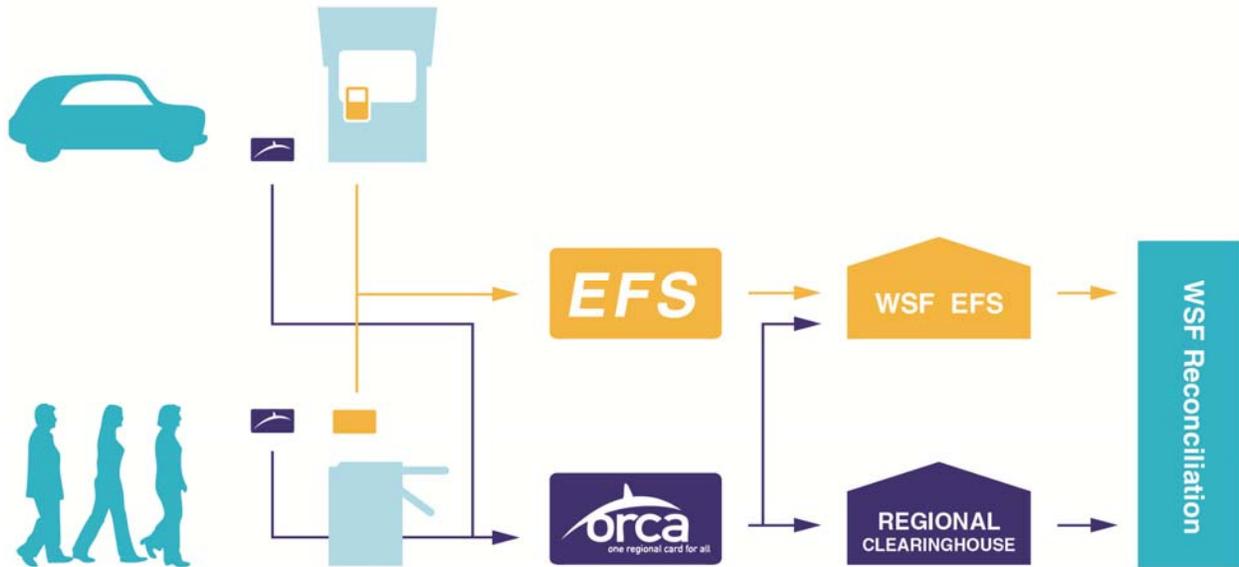
Table 3: Comparison of Fare Payment Methods

	<i>Wave2Go</i>	ORCA	Commercial Accounts	<i>Good To Go!</i>
Pre-purchase options	<ul style="list-style-type: none"> • Internet (<i>Wave2Go</i> web store) • Unattended kiosk • Attended booth 	<ul style="list-style-type: none"> • Internet (ORCA website) • Transit agency customer service offices • Certain retail outlets • Sound Transit ticket vending machines 	<ul style="list-style-type: none"> • Internet (<i>Wave2Go</i> web store) • Attended booth 	<ul style="list-style-type: none"> • Internet (<i>Good To Go!</i> website) • Customer service center • Certain retail outlets
On-site purchase options	<ul style="list-style-type: none"> • Purchase tickets from booth or kiosk 	<ul style="list-style-type: none"> • None – ORCA cards cannot be purchased or value added at WSF facilities 	<ul style="list-style-type: none"> • Commercial accounts cannot be established at the terminal – the account needs to be set up in advance 	<ul style="list-style-type: none"> • None – no <i>Good To Go!</i> sales facilities at WSF
Payment methods	<ul style="list-style-type: none"> • Credit card for all options • Debit card at attended booth • Cash at attended booth 	<ul style="list-style-type: none"> • Credit card for all options • Debit card at customer service offices and Sound Transit vending machines • Cash at all locations except Internet 	<ul style="list-style-type: none"> • Post-billing arrangement 	<ul style="list-style-type: none"> • Credit card • Cash (staffed locations and pay by mail)

SECTION III. INTEROPERABILITY OPTIONS

This section presents four options for achieving interoperability between *Wave2Go*, ORCA, *Good To Go!* and Commercial Accounts. They are generally organized in terms of increasing complexity and impact on existing systems. Although each option is presented uniquely for the purpose of this white paper, certain options could be combined or evolve/be replaced over time.

Option 1: Implement ORCA Stored Ride



Under this option, the stored ride capability of the ORCA card would be activated to allow customers to buy multi-ride vehicle or passenger tickets on their ORCA card. The primary benefit of this option is that it would allow customers who use an ORCA card for transit or WSF passes plus a multi-ride card to consolidate both into their ORCA card and account. ORCA also supports concession (senior, disabled and certain other classes) fares as agreed to by the seven agencies participating in the program.

OPTION SUMMARY

Wave2Go – No change in products, but some system upgrades needed
ORCA – Enable stored rides for walk-on and vehicle travel
Good To Go! – Not implemented
Commercial Accounts – No Change

Key elements of this option are as follows:

- Although stored ride functionality has been developed for ORCA (and is in use by Sound Transit), it has not been deployed for WSF at this time. A system update may be required by the supplier of the ORCA system to fully deploy this functionality for WSF.
- A system update may be required by the supplier of the *Wave2Go* system to support full implementation across WSF.

Options 2 and 3: Implement *Good To Go!* for Vehicles

These options would allow vehicle customers who have a valid *Good To Go!* account to charge their ferry trip against that account. Although this option could theoretically be implemented for walk-on passengers, as a practical matter *Good To Go!* is a vehicle technology, and it is more likely that walk-on customers would carry a *Wave2Go* ticket or ORCA card than a vehicle toll transponder. The following discussion therefore focuses on implementing *Good To Go!* for vehicles.

OPTION SUMMARY

Wave2Go – System upgrades needed; depends on sub-option

ORCA – No change or stored rides could be implemented per Option 1

Good To Go! – Implemented for the vehicle stream only

Commercial Accounts – No change or possibly convert to *Good To Go!*

The way *Good To Go!* works, in general, is that the system either reads a toll transponder mounted in the windshield of the vehicle or captures the vehicle license plate through a video system. Customers choosing to register with *Good To Go!* will have their transponder identification or vehicle license plate is associated with their *Good To Go!* account which may be pre-paid or billed. Customers without a transponder or *Good To Go!* account will be billed based on a records search of their license plate.

Although the same *Good To Go!* transponder or license plate can be used on any of the three toll roads (Tacoma Narrows Bridge, SR 167 and SR 520), there are some differences in how it has/is being implemented:

- The Tacoma Narrows Bridge also has toll booths at which customers without a *Good To Go!* account (transponder or license plate) can stop and pay cash or use their credit card to pay the toll. Toll booths are not available on either SR 167 or SR 520.
- SR 167 does not utilize license plate reading systems. Single occupant vehicles must use a toll transponder (multi-occupant vehicles do not need a transponder or, if they have one, need to disable it so they do not get charged). License plate reading technology cannot differentiate if the vehicle is multi- or single-occupant and, hence, is not used.

In the case of WSF, it is assumed that all vehicles will stop at a seller booth. This means that the *Good To Go!* reader equipment can potentially be simpler than that installed on the highways where transponders and license plates need to be read at high speeds. Seller booth operations also allow the number of passengers in a vehicle to be determined and fares charged as appropriate.

Other considerations/assumptions in this option include:

- For the purpose of this white paper, it is assumed that all vehicle lanes at all terminals would be equipped to accept *Good To Go!*. Implementing at select terminals or booths only is also a possibility, but will require further analysis.
- New reader and other site infrastructure would be required at the terminal to process *Good To Go!* customers. The specific equipment depends on Option 2 or Option 3 as described below, and whether WSF wishes to use both transponder and license plate technology, or just transponder technology like SR 167.
- *Good To Go!* site (WSF terminal) controller devices require communication with the *Good To Go!* back-office customer service system to download valid/invalid transponder lists and upload transactions as they occur. The *Good To Go!* back-office needs to track the

balance in each customer's account closely in order to trigger auto-replenishment or flag the account and associated transponders as invalid.

- Ferry transactions would be posted to *Good To Go!* accounts at the statewide customer service center. A mechanism to settle and transfer funds from the account to WSF would be required.

In addition to providing new infrastructure at WSF terminals, The *Good To Go!* back-office system will require software and other updates to manage and report ferry transactions independently. WSF would be considered a new 'operator' in the same way that the Tacoma Narrows Bridge, SR 167 and SR 520 are, from a systems perspective, considered individual 'operators'. It will also require a software update to manage revenue distribution to WSF, as well as an agreement on operations cost (service fees) between the ferry and toll operating divisions.

Option 2: Implement *Good To Go!* with Attended Booths



Under this sub-option, *Good To Go!* would be deployed in a way that supports the current vehicle tariff structure. At all terminals, drivers would be required to stop at the booth and vehicle/driver plus passenger fares computed using *Wave2Go* equipment (i.e. the point of sale terminals in the booth) and the total fare charged against the *Good To Go!* account.

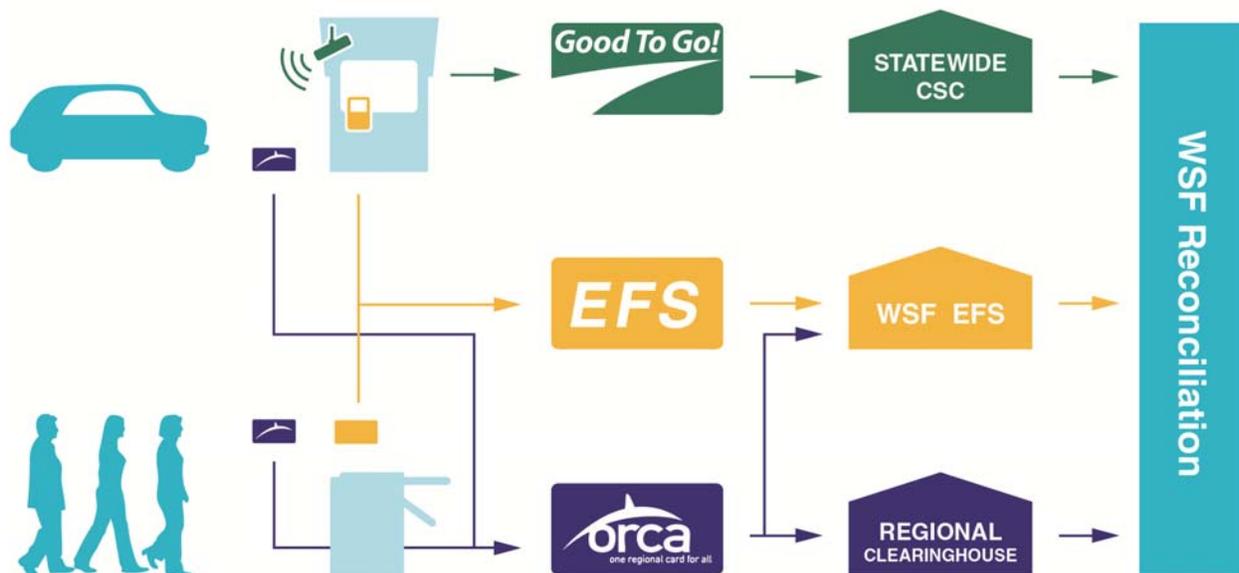
Operation is assumed to be as follows:

- Each vehicle will stop at a seller booth as they do currently. The ticket seller will determine the vehicle classification, total fare to be collected, and passenger count per existing rules for vehicle/drivers and passengers.
- *Good To Go!* reader equipment would be implemented as an additional peripheral to the WSF electronic fare system in the same way that ORCA readers are connected to the electronic fare system. In this case, all fare computation is done using electronic fare system equipment with only the total amount of the transaction passed to the *Good To Go!* account

- To minimize infrastructure requirements and costs, all *Good To Go!* customers will be expected to have a transponder (like SR 167), and *Good To Go!* reader equipment will be installed at all booths. License plate reading will not be supported.
- If the *Good To Go!* system indicates that a vehicle has a valid transponder, the total vehicle and occupant fare is charged to the associated *Good To Go!* account by the ticket seller.
- If a vehicle does not have a valid *Good To Go!* account, the ticket seller collects cash, credit card or other fare media.
- Commercial accounts would remain separate.

In addition to requiring new *Good To Go!* readers and other infrastructure, this option would require modifications to the existing *Wave2Go* electronic fare system to tie it to *Good To Go!*.

Option 3: Implement *Good To Go!* with Unattended Tollbooth Lanes



The objective of this option is to create a customer experience similar to the open road tolling available at WSDOT toll facilities. The fare to be charged would be based on vehicle length only; no passenger fares would be charged, and no frequent use or senior discounts would be available.

Attributes of this option are as follows:

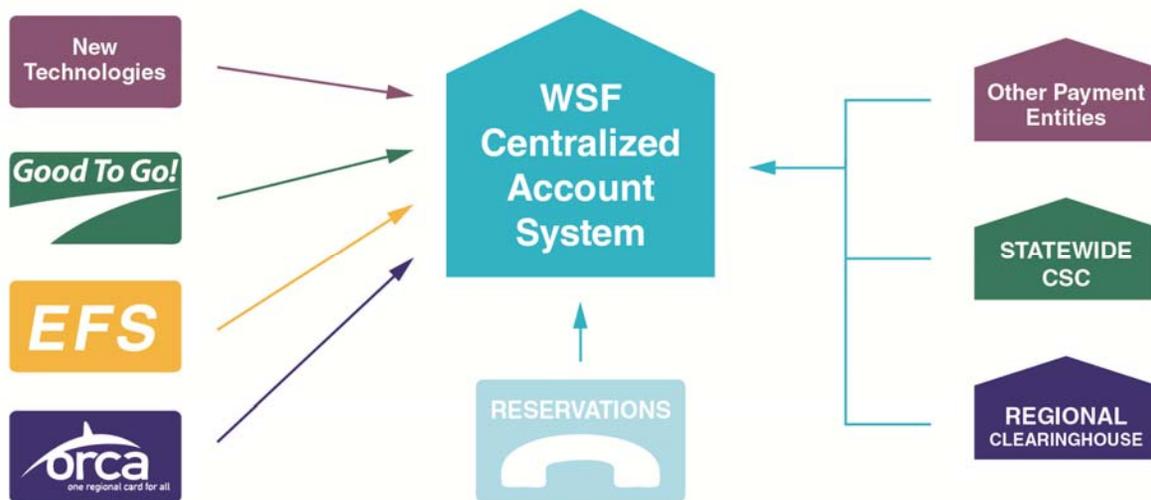
- In addition to the reader equipment described in option 2, electronic equipment to measure vehicle size while it passes through the tollbooth zone would be required. The WSDOT toll systems count number of axles as a proxy for vehicle length, so this would be new equipment that has not previously been deployed for WSDOT toll facilities.
- No integration with *Wave2Go* would be required. *Good To Go!* would be installed as a separate, stand-alone system connected directly to the regional *Good To Go!* customer service center, thus simplifying integration requirements. All revenue and traffic data would need to be consolidated from the different systems by WSF upon transfer of transaction information between the *Good To Go!* customer service center and WSF.

- License plate reader technology would also be required to address situations in which a non-transponder equipped vehicle uses the unattended lane (due to physical constraints at the terminals, it is not practical to have a non-equipped vehicle backup or pull over).
- At smaller terminals, it may not be practical to establish an unattended booth or lane so the same lane may be shared with other customers.
- If the *Good To Go!* system indicates that a vehicle has a valid transponder, the vehicle fare is charged to the associated *Good To Go!* account.
- If a vehicle does not have a valid transponder, the vehicle passage would be recorded by the license plate reader system and processed as a violation or an image based transaction depending on whether or not the customer has a valid *Good To Go!* account (same as the toll roads). Alternatively, if the lane had a staffed booth, other media could be accepted for payment.
- Vehicle passengers would not be counted with this system.

Commercial account users would not be able to use the transponder lanes if they wanted to continue to receive the benefits of post-travel billing and frequent use discounts.

Under the current tariff, this option could potentially be implemented at certain west side terminals as passenger fares are currently not collected. Implementation on the east side/certain islands would require a tariff change to introduce a “vehicle-only” fare. The fare system would not be used for counting vehicle passengers in this option.

Option 4: Account-based WSF System



Whereas the previous options focused on tying together existing systems, this option presents a fundamentally different concept where WSF moves to a completely centralized account system and any and all fare media simply act as identification devices. Under this option, all logic for computing vehicle and passenger fares, including all logic for calculating discounts, would be maintained centrally in a WSF system, and all media (*Wave2Go*, ORCA, *Good To Go!*, future technologies) would act as an identification device.

Customers wishing to pre-purchase discounted products (e.g. multi-ride tickets) would be required to establish an account (registered or anonymous) with WSF, and pre-pay for those products. They would also associate the identification number of whatever payment instrument(s) they would like to use (*Wave2Go*, ORCA, *Good To Go!*, new technology device, etc.) to that account.

Under the current tariff, vehicle classification and number of passengers would still need to be determined at a booth, however the final price would not be determined until one of these devices was presented, at which point the fare would be computed based on the central logic, with applicable discounts applied, and a ride or value deducted. A customer could choose a preferred medium, and households could have all media tied to the account so that they would receive applicable discounts if one medium was used one day, another medium used the next, etc.

Casual use customers (e.g. ones having one of those other media but choosing not to register with WSF) could still use that media to pay for full-fares.

A new or replaced system would manage all the central accounts and would include all logic to calculate fares. It would also include back-office interfaces to ORCA, *Good To Go!* and other systems to be able to validate a medium presented for payment, and collect funds from those other systems. Ride history would be maintained in the central computer system, and any discounts, rebates or other incentives would be computed and applied at the time of travel, versus through applying the discount up front as is currently done with prepaid multi-rides. As an example, a customer making XX trips in a period could be charged full fare for the first few trips, then receive discounts or rebates on subsequent trips after that. As another example, the discount amount could vary by time of day or day of week to support demand management strategies as it would be applied at the time of use, not in advance.

Other attributes of this option include:

- All reader devices (ORCA, *Good To Go!*, future payment technologies) would be connected as peripherals to an extensively updated or replaced WSF electronic fare system that would generally only be required to read the identification number of the payment device, thus simplifying integration. In the case of ORCA, the equipment would still need to read and write back to the card in order to update the stored value (ORCA is a card-based system with the account data held on the card), however all logic to calculate discounts would still reside in the central system thus eliminating any need for passes or rides to be stored on the card.

OPTION SUMMARY

Wave2Go – Major upgrade or replacement required. Ticket would be used as an identifier only (no specific product on ticket), with all ride, discounts and other information stored centrally

ORCA – Would be used as an identifier with the appropriate fare deducted from stored value (no passes or rides)

Good To Go! – Would be used as an identifier

Commercial Accounts – Would migrate to new system

- Any type of open payment smart card, with the appropriate back-office financial agreements, could be used for cash payments.
- Mobile phone applications have potential for transmitting an identification code to allow posting of transactions to an account, or a banking link to allow direct payment transactions to occur.
- Commercial accounts would migrate to this new system, and the identification devices that the commercial operator uses (ORCA cards, *Good To Go!* transponders, etc.) linked to their account.
- Reservations would also be linked to the account, and any reservation deposits would be included in the account and applied to the fare automatically.
- Each time a payment instrument was presented, the identification number would be read and the account (ride or value) debited as appropriate.
- New pricing concepts such as time of day discounts, pre-booking discounts, frequency of use discounts (where the price reduces as more trips are taken in a given period), etc. could be tested or implemented by updating logic in the central account system without changing any of the media or modifying/updating any third party systems such as ORCA and *Good To Go!*.

This option represents significant changes to existing fare payment systems, but introduces new options to provide flexibility.

SECTION IV. PRELIMINARY IMPACTS ASSESSMENT

The table on the following page presents a preliminary qualitative assessment of each of the interoperability options against a set of criteria developed based on legislative fare direction³. Criteria have been grouped in four areas:

- 1. Fare media interoperability:** Fare media interoperability criteria include: the ability of the option to have *Wave2Go*/EFS, ORCA, and Good To Go! accepted as payment by WSF; the ability of the option to reduce the number of fare media that a household needs for WSF travel; and whether the option allows WSF fare media to also be used for travel on tolled highways.
- 2. Fare structure changes required:** Fare structure change criteria include: the significance of the fare structure changes that would be required under the option; the ability of the option to support alternative fare structures, the commercial program, surcharges and discounts; the changes that would be required for existing fare products; and the option's ability to support vehicle time of day pricing and fares that vary by travel shed.
- 3. Technology and infrastructure changes required:** The technology and infrastructure changes required criteria include: the magnitude of the changes required to existing systems; additional infrastructure required; ability to support future interoperability/emerging technologies; impact on the vehicle reservation project; and the opportunity to leverage WSF's reservation system investment.
- 4. Costs:** The cost criteria include the initial capital costs; operations costs; and the impact of the option on future costs that will be needed at some point to update/replace *Wave2Go*/EFS.

Option 1. Implement ORCA Stored Ride. This option provides the least interoperability, requires no changes in the existing fare structure, requires minimal infrastructure and technology changes, and is relatively low cost. The option does not support vehicle time of day pricing, does not support future interoperability/emerging technologies, and will have no impact on the vehicle reservation system. The primary advantage of this option is that it allows customers to reduce the number of fare media that they have to have for WSF travel.

Option 2. Implement Good to Go! with Attended Booths. This option improves interoperability significantly, requires moderate changes to the fare structure affecting primarily the use of vehicle and passenger multi-ride cards; has moderate technology requirements for transponder readers at terminals and a back-end interface with *Good To Go!*, and has initial capital costs of \$2.0 to \$5.0 million. This option has the same operations costs as now and would not reduce the level of future investment needed in a replacement or upgrade for *Wave2Go*/EFS.

Option 3. Implement Good To Go! With Unattended Booths. This option improves interoperability but would limit the drive on customers to using *Good To Go!*. It would require significant fare changes for drive on customers and significant technology and infrastructure requirements. The capital cost is estimated at \$5 to \$8 million, but would significantly reduce or eliminate the need for future investments in a stand-alone *Wave2Go*/EFS system because vehicle customer fare media would migrate

³ Legislative direction on WSF's fares is discussed in the *Situation Assessment White Paper*.

to Good To Go!. Walk-on customer fare collection is not as complex and would not require the same level of investment in *Wave2Go*/EFS.

Option 4. Account-Based WSF System. This option would improve interoperability with any fare media being used as payment for either walk-on or drive-on customers. It could be implemented without changing the fare structure. The account-based WSF system would require significant technology and infrastructure changes, but would leverage the investment being made in the WSF vehicle reservation system. It would cost more than \$8 million to implement and could reduce or eliminate the investment in future *Wave2Go*/EFS system replacement.

	OPTION 1	OPTION 2	OPTION 3	OPTION 4
	Implement ORCA Stored Ride	Implement Good To Go! with Attended Booths	Implement Good To Go! with Unattended Booths	Account Based WSF System
FARE MEDIA INTEROPERABILITY	●	●	●	●
Acceptance of existing fare and toll media at WSF:				
Wave2Go	✓	✓	✓-	✓
ORCA	✓	✓	✓-	✓
Good To Go!	⊗	✓	✓	✓
Reduces number of fare media that a household needs to have for WSF Travel	✓-	✓+	✓-	✓+
	<i>(must use ORCA and have a card for each passenger)</i>	<i>(any media)</i>	<i>(must use Good To Go! for vehicles)</i>	<i>(any media)</i>
Can be used for travel on tolled highway	⊗	✓	✓	✓
FARE STRUCTURE CHANGES REQUIRED	●	●	●	●
Fare structure changes required for implementation	None	Moderate	Significant	Low to Moderate
Ability to support alternative fare structures	✓	✓	⊗	✓+
Ability to support commercial programs	✓	✓	✓	✓
Ability to support surcharges	✓	✓	✓	✓
Ability to support discounts	✓	✓-	✓-	✓+
Impacts on existing fare products	None	- No multi-ride cards with Good To Go!	- Significant change for drive-on customers - No change for walk-on customers	None
Ability to support vehicle time of day pricing	⊗	⊗	✓	✓
Ability to support fares that vary by travel shed	✓	✓	✓	✓
TECHNOLOGY AND INFRASTRUCTURE REQUIRED CHANGES	●	●	●	●
Magnitude of changes required to existing systems	Low None	Moderate - Transponder readers at terminals - Back-end interface with Good To Go!	Significant - Terminal transponder & license plate readers & vehicle measuring system - Back-end interface with Good To Go!	Significant - Readers at terminals - Back-end interface with Good To Go! - New back-end account system - Major changes to or replacement of EFS
Additional infrastructure required				
Ability to support future interoperability/emerging technologies	⊗	✓	✓-	✓
Long term maintainability and flexibility	⊗	✓-	✓-	✓
Ability to accommodate emerging technologies	⊗	?	?	✓
Impacts on reservations project	None	Uncertain - likely minimal	Significant additional development would be required	None
Opportunities to leverage reservations investment	⊗	✓-	⊗	✓
COST				
Capital Costs	\$	\$\$\$	\$\$\$\$	\$\$\$\$\$
Operating Costs	Same	~Same	Less	Same
Reduces level of future expenditure to replace Wave2Go/EFS	⊗	⊗	✓	✓-

Key			
⊗	Does not achieve objective	\$	<\$0.5 million
✓-	Achieves objective, but has limitations	\$\$	\$0.5 million to \$2.0million
✓	Achieves objective	\$\$\$	\$2.0 million to \$5.0 million
✓+	Achieves objective & offers additional benefits	\$\$\$\$	\$5.0 million to \$8.0 million
?	Uncertain impact	\$\$\$\$\$	>\$8.0 million
n/a	No impact	●	Best /least difficulty among options in achieving objectives
		●	Mid-point among options
		●	Least /most difficulty among options in achieving objectives