Payment Gateway – Innovation in Multiple Payments

R Nagasubramanian
Research Scholar, Vels University, Plot 2A, Andavar Street, Ganapathy Puram, Chrompet, Chennai – 600 034

S.P.Rajagopalan, PhD.
GKM College of Engineering & Technology, Chennai- 600 063, India

ABSTRACT

With the advancement of technology and internet usage, the world is shrinking day by day and the business boundaries are expanding beyond imagination. Any business owner nowadays cannot dream of launching in a bigger way without the online presence (payment facility). For consumers, with Ecommerce and best infrastructure to ship products, they can dream of getting any product/service from any part of the world in a short time cutting across all barriers. Ecommerce systems depend mainly on the payment gateway service providers to facilitate payment transactions. Now the payment gateway service providers are focusing on providing lot of features and user friendly options to increase market share. Through this paper, a new approach to the Multiple payment modes is brought into light which will be different from the usual multiple payment options available in the Online Payment Industry. With this option, user experience is made great and saves time for the user with the flexibility to pay from many options.

General Terms

This paper discusses an improvement in the existing important feature of Online Payment Gateway called Multiple Payments which will make Online Payment Gateway incorporating the best of features of Split Tender Payment [1] option also which makes this mode more efficient and user friendly.

Keywords

Online Payment, Split Tender Payment, Multiple Payment, Security, Credit Card, Wire Transfer, Debit Card, Check, Banking, Master, VISA, Amex, PCI DSS.

1. INTRODUCTION

Online payment gateway empowers the portals to be a powerful tool to make life simple and gives the luxury of making payments to any biller in any part of the world. Online Payment is the best way making payments for various purposes like making utility payments, transferring funds apart from supporting ecommerce to purchase products or services. There are various systems and complex processes involved in the online payment cycle even though for the user it may take few seconds to complete the payment. Refer the Figure 1. Generally any typical online payment system that deals with the Merchants as their main vendors who will cater to the online payment of their customers consists of below structure. The system will have customers who will pay their bills or any online payments, merchant website which will have all options to show and receive payments of their customers and payment gateway provider who will be instrumental in facilitating the payment by interacting with the various payment processors like [2]Master/Visa[3]/Amex/ACH.

Every payer needs to login into the merchant website using his login credentials, select the bill to be paid, select the payment mode like be Credit card/Debit card or online bank account. The payment gateway provider performs the task of collecting the payment credentials, send it to the payment processors, check card validity, credit limit validity, request for making payment to payment processors, gets the result of either success or failure of payment status with detailed error code and return it back to the merchant website which originated the call along with transaction id. If the details are valid and customer has credit limit to make payment, amount will blocked in his card credit limit and credit request will be given to vendor bank account. On the settlement period, the actual transaction takes place and the credit and debit of account will take place in case of card account. The reflection on the transactions list or statement happens at the preset frequency when the card issuing bank account queries the payment processors and fetches information to show to its clients which will be generally couple of times in a day at a predefined interval. In case of bank account, the debit will happen from customer account at the predefined interval of processing of bank accounts and in general, this will be in each hour. The result code and result message conveys the transaction status to the merchant site with detailed information on error code, if any along with the transaction id. The transaction id returned along with the information sent for making payment will be stored in the merchant database and will be presented as the report to the customer to provide the complete information about the transaction happened. Each payment will be processed based on merchant settings on settlement time on that day and merchant may receive payment in couple of days based on arrangement he has with payment gateway providers. A successful transaction can be cancelled (made void) before settlement by merchant himself and if to be cancelled after the settlement, refund can be made by requesting payment processor with another api with required parameters. More information in detail about an online payment gateway can be seen in the patent given in reference [4].

The entire process of payment may take few seconds to a minute in a secured way using various protocols and systems. Since security is the main concern, the industry follows the standard called "Payment Card Industry Data Security Standards - PCI-DSS [5] which is the well defined standard adopted in payment gateway systems around the world. In this paper, we will bring out some additional features in Multiple Payment which will increase the utility, user friendliness and make the online payment a more convenient.
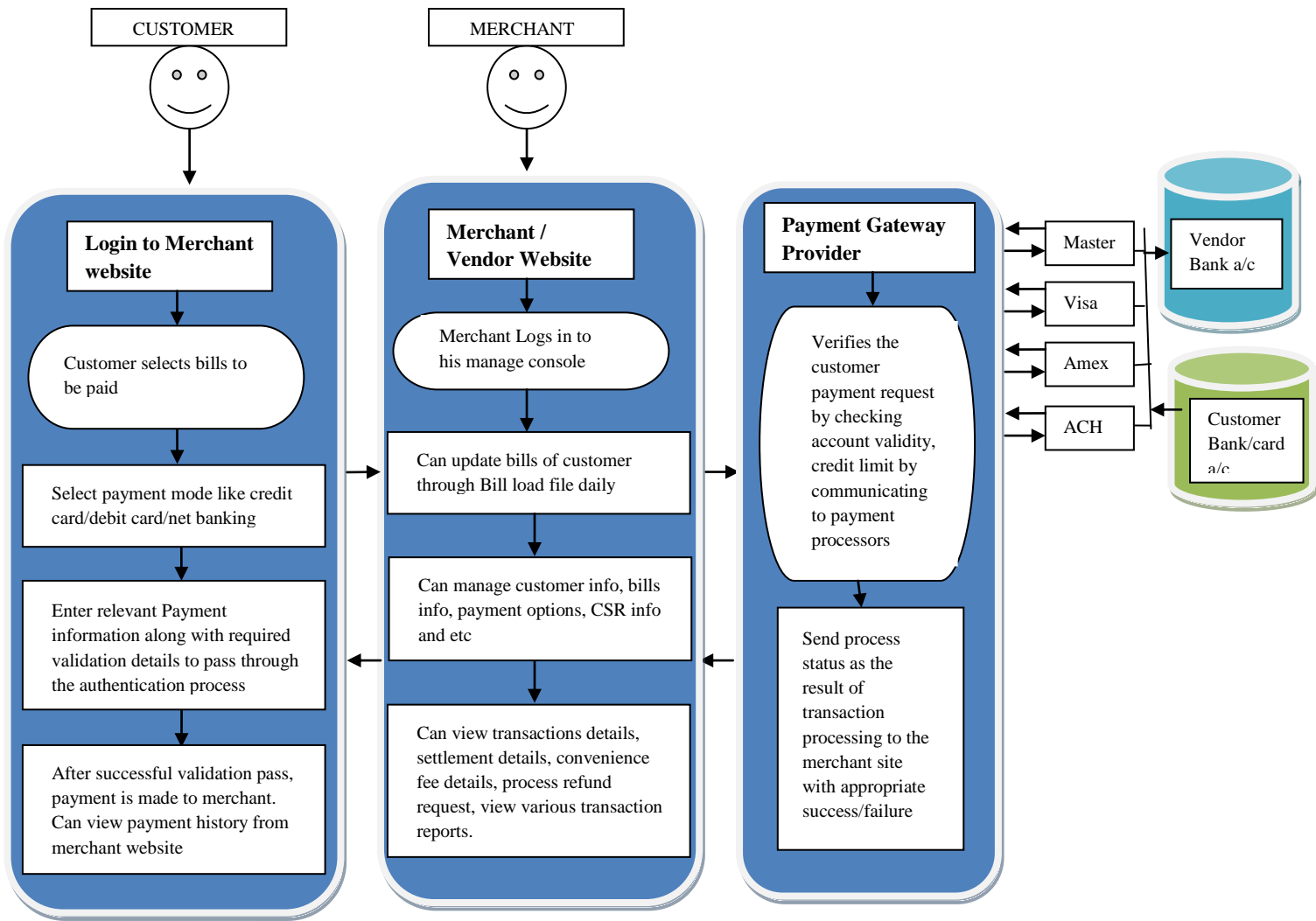
Fig 1: Existing Online Payment System

2. INNOVATIONS IN MULTIPLE PAYMENT

Multiple Payment

Multiple Payment is the option to make payment for more than one bill of one or more than one vendor with a single click.

Here we assume that the vendors are registered with the payment gateway and are in agreement with getting paid through this unified service provided by payment gateway either directly or through some merchants.

2.1 Options available in existing Multiple Payment feature

The existing online systems or electronic payment systems allows the payment to be made for single bill using multiple sources[6] or allow selecting multiple bills but payment to be made from single source. For example, current systems allow users to select more than one bill from single merchant and can make payment using credit card or any other method to make

payment directly to the merchant. The payment can be made from loyalty cards also in which reward points can be redeemed for money and remaining amount can be made from either credit//debit cards. There is no system designed to make payment using more than two sources in existing split tender payment option. Consider the scenario of payment to be made is Rs.10000. If the user has reward points of 1000 which can be redeemed as Rs.1000 and if the user has credit card which has the limit of only Rs.6000 and if he has debit card or access to bank account online (net banking), user cannot make the payment as the current systems allow only one type of payment other than reward points. Most of the online merchants who receive payment do not allow the payment from multiple payment processors like Master/Amex/Visa at a time (more than one payment processor in a split tender payment).
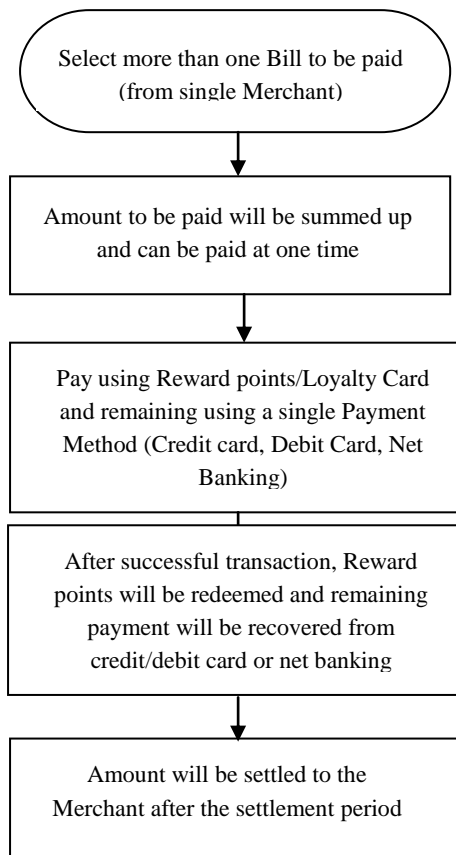
Select more than one Bill to be paid
(from single Merchant)

↓

Amount to be paid will be summed up
and can be paid at one time

↓

Pay using Reward points/Loyalty Card
and remaining using a single Payment
Method (Credit card, Debit Card, Net
Banking)

↓

After successful transaction, Reward
points will be redeemed and remaining
payment will be recovered from
credit/debit card or net banking

↓

Amount will be settled to the
Merchant after the settlement period

Fig 2: Traditional Multiple Payment feature

[8]The limitation is forced due to various reasons like the ability to interact with more than one bank or service providers and ability of existing system to send request for multiple service providers, get each requests validated, get each request approved and track each responses, making settlement to various merchant/vendor accounts which may incur more operation cost and technical challenges. Above all it also involves transactions with various payment processors for each item/invoice which may incur more cost to the merchants concerned. Refer Figure 2 given above which depicts the general overview of existing Multiple Payment system.

2.2 Proposed features to Existing Multiple Payment Option

The new system will help in making the payments in the following efficient ways .In our new application, we combine the advantage of two important features - using Multiple Payment and Split Tender Payment feature. Multiple Payment is the option to make payment of bills of more than one vendor in a single click. Split Tender Payment feature is the ability to make payment using two sources – one reward point / loyalty card and another source like credit/debit/savings and etc for a single bill. In our new system, users can select multiple merchants/vendors, select one or more bills, can choose more than one payment modes and can make payment directly to the merchant(s) or even can use the split tender payment to pay multiple bills. To illustrate, let us say that user can select multiple merchants like telephone bills from one vendor, electricity bill from one vendor, car insurance bill and etc and make payment partially using his credit card, partially using his savings account and can use any other payment

mode(s) if required. Consider the scenario of paying Insurance Premium for car insurance from company1 is for Rs.10000 and Telephone bill of Rs.4000. Under this proposed system, an user can pay the amount using various payment modes like using credit card, using net banking or using debit card, using reward points and etc. The best part of this is option can be even provided to use different types of credit/debit cards like Master, Visa and etc at the same time to make the payment. Refer Figure 3 given below.

Another important feature is to allow a bill to be paid using various payment provider type like Master, Visa and Amex. For example, to make a total payment of Rs.14000 can be paid using credit card itself by selecting payment method as "Credit card". Then the payment can be made from more than one credit card. One payment of Rs.7000 can be made from a Master Credit card, another Rs.5000 can be paid using a Visa credit card and another Rs.2000 can be made using a Amex credit card or can use existing Reward points to make this last part of payment.
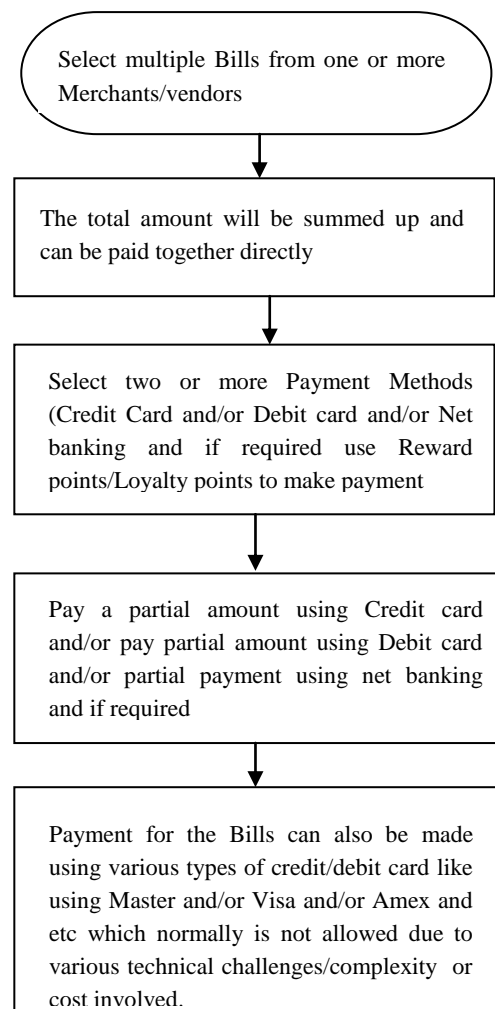
Select multiple Bills from one or more
Merchants/vendors

↓

The total amount will be summed up and
can be paid together directly

↓

Select two or more Payment Methods
(Credit Card and/or Debit card and/or Net
banking and if required use Reward
points/Loyalty points to make payment

↓

Pay a partial amount using Credit card
and/or pay partial amount using Debit card
and/or partial payment using net banking
and if required

↓

Payment for the Bills can also be made
using various types of credit/debit card like
using Master and/or Visa and/or Amex and
etc which normally is not allowed due to
various technical challenges/complexity or
cost involved.

Fig3: Proposed Multiple Payment Feature

Table 1. Comparison between Existing Multiple Payment Option mode used and Proposed Multiple Payment Mode in Online Payment Gateways

Sl. No	Existing Online Payment Gateway using Multiple Payment Mode Option	Proposed Online Payment Gateway using Multiple Payment Mode Option
1	Will allow multiple bills from single vendor to be selected and paid	More than one bill from one or more vendors can be selected and paid
2	Single Payment method like Credit card / Debit card / Online banking and/or with rewards points can be used for making payment.	Proposed solution is having option to select more than one payment methods like credit card, debit card, online banking and etc to be used to make the selected multiple payment option.
3	Cannot use two different credit card brands like Master, Visa , American Express and etc	Can use credit card to make payment at a time using multiple brands like Master/Visa/American Express and etc

2.3 Screens depicting suggested steps of implementing proposed Multiple Payment Feature

Given below the screens which will depict the various steps involved in implementing the proposed Multiple Payment with enhanced Split Tender Feature taking some sample invoices to be paid using multiple payment modes. The sequence of the screens and comment below each screen will help to understand the new system very clearly. Here we have taken bills from two different vendors Ram & Co and Jack Profile. Here one bill is paid using credit card, one bill is paid using wire transfer and one bill is paid using multiple payment source using split tender payment option.

Refer Figure 4: The screen shows the list of Merchants (Billers available within each Merchant), their invoice number and amount.

Refer Figure 5: This screen shows the list of payment modes available in the application through which user can make payment to the billers. Through this screen, user is selecting Credit card payment mode to pay bill CS101119-5.

Refer Figure 6: This screen helps to make payment using credit card. User also has option to save the information so that it can be re-used when he makes payment using "Credit Card" mode next time reducing many key strokes

Refer Figure 7: Through this screen, user is making payment to another vendor for the bill CS101119-6. Scheduling payment through ATM card for this bill.

Refer Figure 8: Through this screen details of ATM card are entered and payment is scheduled.

Refer Figure 9: Through this screen, user is making payment for the bill CS101119-7 using Split Tender Payment method. Scheduling the payment through Credit card to make partial payment.

Refer Figure 10: This screen shows making payment through Credit card.

Refer Figure 11: Through this screen, user is making payment for the bill CS101119-7 using Split Tender Payment method. Selecting Wire Transfer mode to schedule the payment here.

Refer Figure 12: User enters the details required to make the payment through Wire Transfer mode.

Refer Figure 13: This screen shows the Payment confirmation made with all comprehensive details about Biller, invoice, mode(s) of payment made and status of the payment (shows "Pending" for scheduled payments that are to be processed, "Paid" for payments made, "New" for new record created for the partial payment made with outstanding amount to be paid) and with Action column that has options like "Void" to stop the payment processing which is scheduled where the status will be "pending", "selected" to select specific scheduled bills or split tender payment to be made using multiple modes of payment, "pay" to select an invoice to schedule the payment.

Refer Figure 14: This screen shows the Payment confirmation made with all comprehensive details about Biller, invoice, mode(s) of payment made and convenience paid details. User can take print of this page for his record

Make Payment

Click on the 'pay' action to make a payment on this account.

Name	Invoice Number	PO Number	Currency	Biller	Bill Amount	Min Due Amount	Bill Due Date	Amount Paid	PayMethod	Status	Scheduled Date	Effective Date	Scheduled Amount	Action
Jack Profile	CS101119-5	PO123	USD	sujay	$1,000.00	$100.00	9/16/2010	$100.00		Pending				Void
Jack Profile	CS101119-5	PO123	USD	sujay	$900.00	$100.00	9/16/2010			New				Pay
Ron & Co	CS101119-6	PO123	USD	sujay	$1,000.00	$100.00	9/16/2010			New				Pay
Jack Profile	CS101119-7	PO123	USD	sujay	$1,000.00	$100.00	9/16/2010			New				Pay

Multiple Payment Method:

Amount Due	$3,000.00
Amount Paid	$100.00
Amount Remaining	$2,900.00

[Make Payment] [Back]

Fig 4 : Showing Multiple Bills from Multiple Merchants / Vendors to be paid by a customer.

Multiple Payment Method Selection

Please enter the payment amount, the payment date and then choose your method of payment

Your Information

Account Being Paid	sujay
Customer Name	Jack Profile
Identity Number	Jack7
Account Number	1234
Invoice Number	CS101119-5
PO Number	PO123
Currency	USD

How much do you want to pay?

- ◉ $ 900.00 — Total Amount Due
- ◯ $100.00 — Minimum Amount Due
- ◯ $ 100.00 — Other Amount

$ 900.00 — Total Amount Paid

- ◉ Credit / Debit Card — VISA MasterCard AMERICAN EXPRESS DISCOVER
- ◯ ATM Card — STAR NYCE pulse
- ◯ Check — CHECKS
- ◯ Savings — CHECKS
- ◯ Cash
- ◯ Certified Check — CERTIFIED
- ◯ Money Order
- ◯ Wire Transfer

[Add Payment Method] [Back]

Fig 5 : Scheduling a part payment for a Biller "Sujay" with Invoice Number : CS101119-5 using a credit card.

Credit Card Information

Account Type	Credit Card
Credit Card Type	[VISA ▼] *
Credit Card Number	[4567823476548980] *
Credit Card Expiration Date	[09 ▼] / [2012 ▼] *
Card Security ID Number	[...]
	(see card example for location)
First Name on Credit Card	[William] *
Last Name on Credit Card	[Smith] *
Street Address	[17, Churchill Street, Manhattan,] *
City, State/Province, Zip Code	[NewYork] [NY ▼] [10001] *
Telephone Number	([770]) [422] - [3333] *

☐ Save this payment information for future use?

[Continue] [Reset] [Back]

Fig 6 : Specifying details of Credit Card to schedule a payment.

Multiple Payment Method Selection

Please enter the payment amount, the payment date and then choose your method of payment

Your Information

Account Being Paid	[Ron & Co]	○ Credit / Debit Card
Customer Name	Ron Arnold	● ATM Card
Identity Number	RonCo	○ Check
Account Number	63491	○ Savings
Invoice Number	[CS101119-6]	○ Cash
PO Number	PO123	○ Certified Check
Currency	USD	○ Money Order

How much do you want to pay?

○ $ 1,000.00   Total Amount Due   ○ Wire Transfer

○ $100.00   Minimum Amount Due

● $[500.00]   Other Amount

$ 500.00   Total Amount Paid

[Add Payment Method] [Back]

Fig 7 : Shows the payment being made to second customer "Ron & Co" for invoice CS101119-6 with the assumption that both the Billers are registered with our payment gateway service.

Debit Card Information

Account Type	Debit Card
Debit Card Number	6543781212003421 *
First Name on Debit Card	William *
Last Name on Debit Card	Smith *
Street Address	17, Churchill Street, Manhattan *
City, State/Province, Zip Code	NewYork NY ▼ 10001 *
Telephone Number	(770) 422 - 3333 *

☐ Save this Payment information for future use?

[Continue] [Reset] [Back]

Fig 8: Illustrating payment by Debit Card to Ron & Co. Showing payment to multiple billers with various payment modes demonstrating Split tender option.

Multiple Payment Method Selection

Please enter the payment amount, the payment date and then choose your method of payment

Your Information

Account Being Paid	sujay
Customer Name	Jack Profile
Identity Number	Jack7
Account Number	1234
Invoice Number	CS101119-7
PO Number	PO123
Currency	USD

How much do you want to pay?

- ○ $ 700.00 — Total Amount Due
- ○ $100.00 — Minimum Amount Due
- ◉ $ 100.00 — Other Amount
-    $ 100.00 — Total Amount Paid

Payment method:
- ◉ Credit / Debit Card
- ○ ATM Card
- ○ Check
- ○ Savings
- ○ Cash
- ○ Certified Check
- ○ Money Order
- ○ Wire Transfer

[Add Payment Method] [Back]

Fig 9: Scheduling a payment to Biller Sujay for invoice CS101119-7 using Split Tender Payment Mode with the pre-condition that he is using the same payment gateway and Payment gateway service provider prvoides the ability of Multiple Payment uniting various billers.

Credit Card Information

Account Type	Credit Card
Credit Card Type	VISA ▾ *
Credit Card Number	4567823476548980 *
Credit Card Expiration Date	09 ▾ / 2012 ▾ *
Card Security ID Number	...
	(see card example for location)
First Name on Credit Card	William *
Last Name on Credit Card	Smith *
Street Address	17, Churchill Street, Manhattan *
City, State/Province, Zip Code	NewYork NY ▾ 10001 *
Telephone Number	(770) 422 - 3333 *

☐ Save this payment information for future use?

[Continue] [Reset] [Back]

Fig 10 Making payment to Sujay for invoice CS101119-7 using Split Tender option - partial payment using credit card.

Multiple Payment Method Selection

Please enter the payment amount, the payment date and then choose your method of payment

Your Information

Account Being Paid	sujay
Customer Name	Jack Profile
Identity Number	Jack7
Account Number	1234
Invoice Number	CS101119-7
PO Number	PO123
Currency	USD

○ Credit / Debit Card
○ ATM Card
○ Check
○ Savings
○ Cash
○ Certified Check
○ Money Order
⦿ Wire Transfer

How much do you want to pay?

○ $ 1,000.00   Total Amount Due

○ $100.00   Minimum Amount Due

⦿ $ 300.00   Other Amount

$ 300.00   Total Amount Paid

[Add Payment Method] [Back]

Fig 11: Making partial payment to Sujay for invoice CS101119-7 using Split Tender option - Making payment using Wire Transfer Method.

Wire Transfer Payment Information

Account Type   Wire Transfer

Recipient Bank Information

Name	Bank of America	*
Street Address	10, North Gate Street,	*
City, State/Province, Zip Code	Florida FL ▼ 45001	
Telephone Number	(123) 521 - 1205	

Recipient Information

Routing/Transit	053101121	*
Account Number	BA189463	*
Re-Enter Account Number	BA189463	*
Name	Smith W	*
Street Address	17, Churchill Street, Manhattan	*
City, State/Province, Zip Code	NewYork NY ▼ 10001	
Telephone Number	(770) 422 - 3333	

[Continue] [Reset] [Back]

Fig 12: Showing the scheduling payment to Sujay for invoice CS101119-7 using Wire Transfer payment method.

Make Payment

Click on the 'pay' action to make a payment on this account.

Name	Invoice Number	PO Number	Currency	Biller	Bill Amount	Min Due Amount	Bill Due Date	Amount Paid	PayMethod	Status	Action
Jack Profile	CS101119-5	PO123	USD	sujay	$1,000.00	$100.00	9/16/2010	$100.00		Pending	Void
Ron & Co	CS101119-6	PO123	USD	Ron Arnold	$1,000.00	$100.00	9/16/2010	$500.00	Debit Card	Pending	Selected
Ron & co	CS101119-6	PO123	USD	Ron Arnold	$500.00	$100.00	9/16/2010			New	Pay
Jack Profile	CS101119-7	PO123	USD	sujay	$1,000.00	$100.00	9/16/2010	$300.00	Wire Transfer	Pending	Selected
Jack Profile	CS101119-5	PO123	USD	sujay	$900.00	$100.00	9/16/2010	$900.00	Credit Card	Pending	Selected
Jack Profile	CS101119-5	PO123	USD	sujay	$0.00	$0.00	9/16/2010			New	Pay
Jack Profile	CS101119-7	PO123	USD	sujay	$700.00	$100.00	9/16/2010	$100.00	Credit Card	Pending	Selected
Jack Profile	CS101119-7	PO123	USD	sujay	$600.00	$100.00	9/16/2010			New	Pay

Multiple Payment Method:

Amount Due $3,000.00
Amount Paid $1,900.00
Amount Remaining $1,100.00

[Make Payment]   [Back]

Fig 13: Showing the list of payments scheduled in our Multiple Payment Mode with the Split Tender Payment mode also implemented within.

Multiple Payment Methods Confirmation

User Information

Payment Made to	Sujay / Ron & Co
Payment Method Type	Multiple
Email Address	wsmith@ibm.com

Payment Amount Information

Payment Date	8/31/2012 5:10:59 PM
Payment Amount	$ 1,800.00
Convenience Fee Amount	$ 6.95
Total Payment Amount	$ 1,806.95

Payment Method Selected

Method	Name on Account	Account/Number	Type	Payment Amount	Conv/Service Fee	Total Amount	Principle Confirmation Number	Conv/Ser Fee Confirmation Number
CreditCard	William Smith	CreditCard-XXXX-8980	VISA	$ 900.00	$ 6.95	$ 906.95	88888888	-1
CreditCard	William Smith	CreditCard-XXXX-8980	VISA	$ 100.00	$ 0.00	$ 100.00	88888888	-1
Debit Card	William Smith	ATM-XXXX-3421		$ 500.00	$ 0.00	$ 500.00	88888888	-1
Wire Transfer	Smith W	WireTransfer-XXXX-9463		$ 300.00	$ 0.00	$ 300.00	88888888	-1

Print Page   Finish

Print this page for your records.

Fig 14: Shows the Payment made with the payment type as Multiple to multiple biller with split tender payment mode also implemented within. Shows details of accounts/payment mode/payment methods/ invoices/amount paid.

3. CONCLUSION

The current systems use multiple payment and allow only one mode of payment to be used to pay entire amount which may not be feasible every time if the total amount is huge. The suggested method of using more than one payment mode to make multiple bill payments at a time and also ability to use split tender payment option is a great advantage. Another advantage of this payment gateway is to directly credit the payment in the respective vendor account instead of the usual practice of getting all payments in one single account and then settling the account either weekly or monthly to all concerned vendors separately again.

The future direction may be to implement this feature in retail sector. Introducing this option in most popular payment gateways such as PayPal [8] or authorize.net [10] and etc. This will help the customers to get all their utility bills at a single place and allow the convenient to select one or more bills and make payment using one or more mode of payment. On the other hand, this will also help the retail merchants to just get started with their business without creating a full ecommerce site of their own. Retail merchants can register themselves, upload the bills, associate their payment gateway account like PayPal/authorize.net, get paid and get amount credited in their account directly. This can decrease the number of transactions that happens from the customer end and also at the same time can help to vendors to get started with the business and save good amount of cost & time.

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