

Interoperability Standards for Mobile Payments

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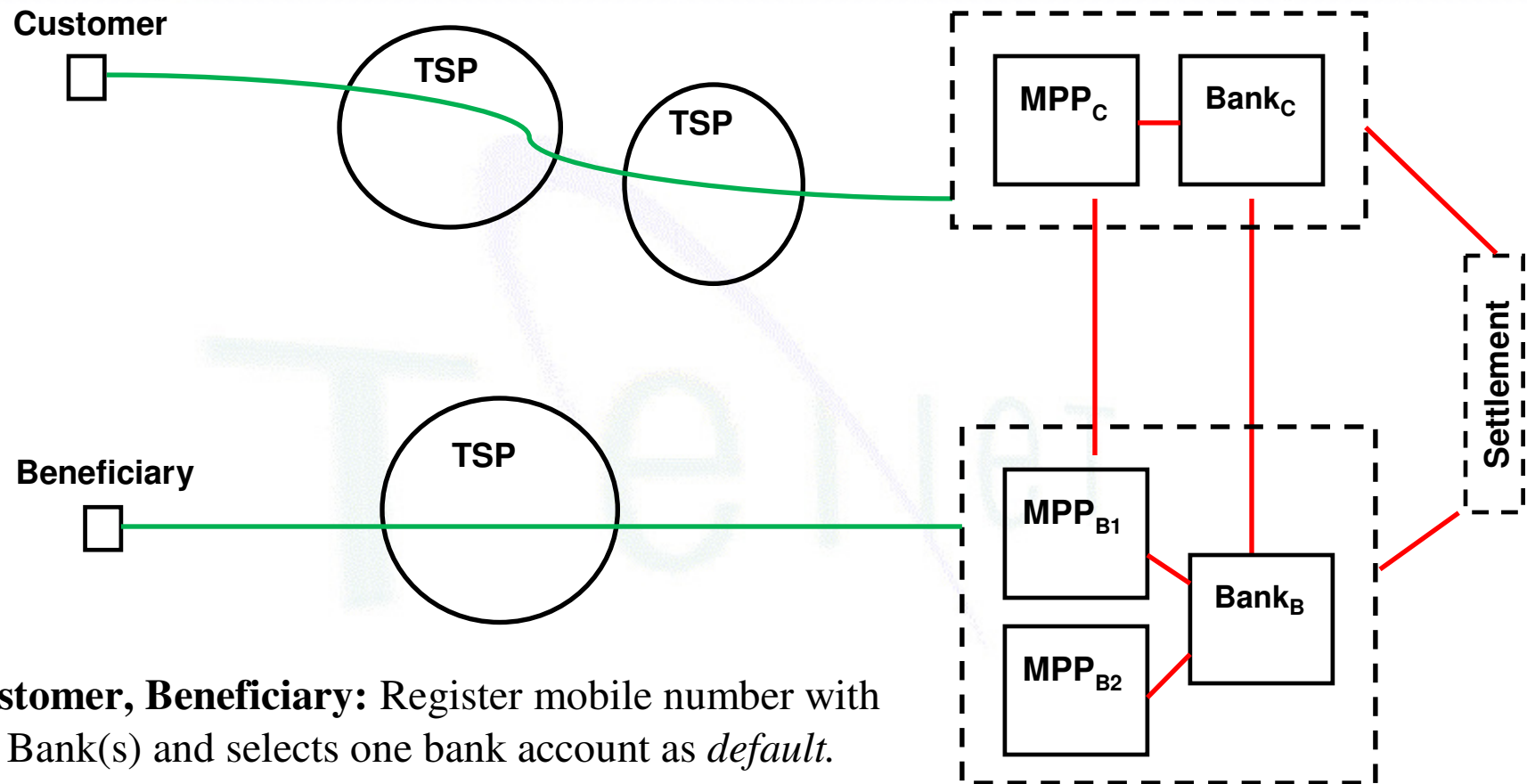
The Standards Document

- Describes
 - The interoperability standards for mobile payments
 - The various entities and their functions / responsibilities
 - The two modes of payment: *push* and *pull* process
 - The numerous processes by the various entities
- Intended for the implementation of the interoperability standards by the various entities involved in effecting mobile payments
- Prepared by the Technology Committee of the MPFI
 - Inputs from the MPFI Executive Committee and the MPFI members
- Accepted by the Mobile Payment Forum of India

Standards: A Snap Shot

- Entities Involved
- Payment Process Overview
- Responsibilities of Different Entities
- Registration Process
- Confidentiality Practices
- Payment Process Details
- Transaction Reversal
- Error Scenarios
- Message Formats
- Transport Layer
- Security

Entities Involved



Customer, Beneficiary: Register mobile number with Bank(s) and selects one bank account as *default*.

MPP (Mobile Payment Provider): Bank may provide its own MPP, or use services of 3rd party MPPs

TSP: Telecommunications Service Provider

Settlement: NEFT/RTGS/NFS or future evolution

Mobile application

(not standard)

Standardised Interfaces



Payment Process Overview

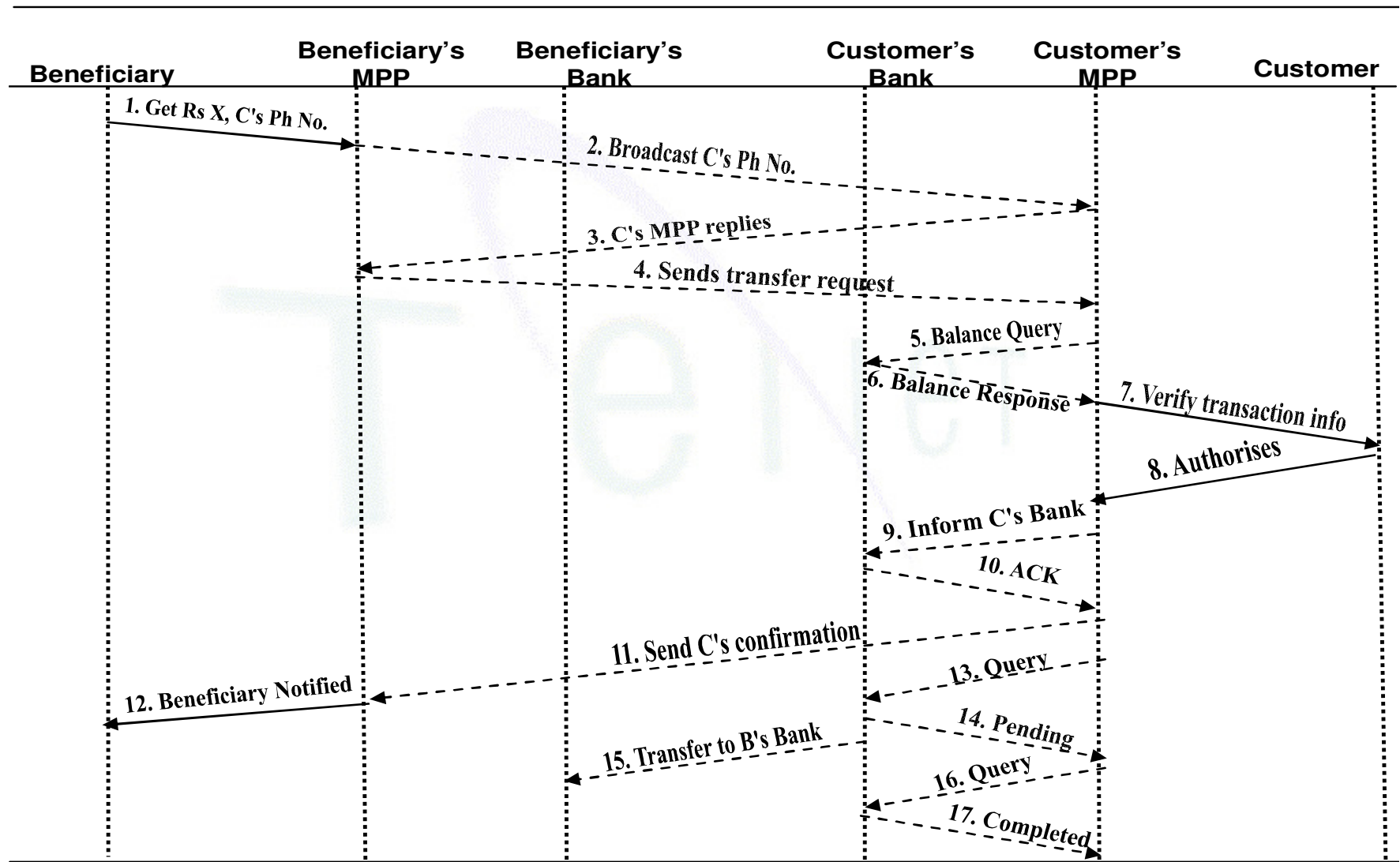
- Types of mobile payments
 - Payment Type 1
 - 2nd party's name
 - 2nd party's mobile number
 - bank name
 - bank account number
 - payment amount
 - Payment Type 2
 - 2nd party's mobile number
 - payment amount
 - In this case the bank account number and MPP ID of the 2nd party have to be looked up by a Broadcast Query Protocol

Types of Payment Processes

- *Pull* process
 - Beneficiary initiates the transaction
- *Push* process
 - Customer initiates the transaction

- For both the *Pull* and *Push* process
 - Flow of operations
Enumeration of the various operations involved
 - Customer-Beneficiary Interaction Diagram
Schematic representation that captures the interaction between the various entities during a mobile payment
 - Finite State Machine (FSM)
A FSM has *states*, *events* and *actions*
 - An object remains in a *state* for some period of time
 - Make a transition to another state only when an *event* occurs
 - The transition is instantaneous and is usually accompanied by some *action*

Pull Process: Interaction Diagram





List of States for Beneficiary: *Pull*

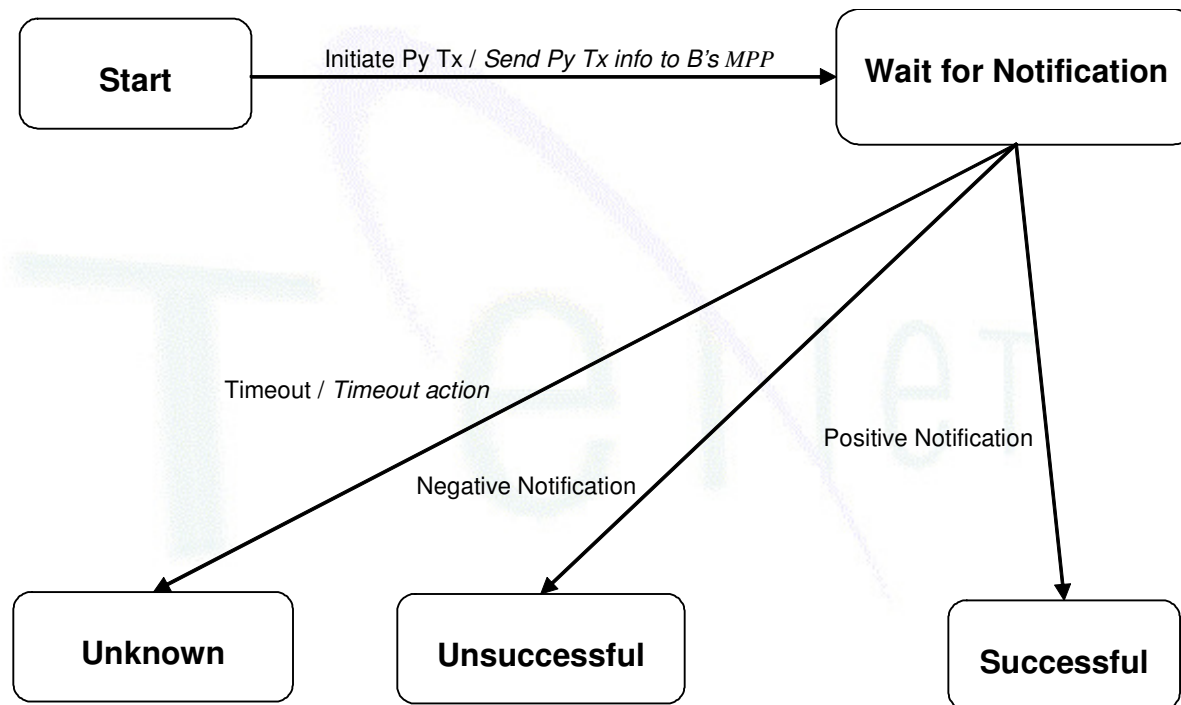
State	Description
Start	Beneficiary is ready to make a new payment transaction request.
Wait for Notification	Beneficiary has initiated the transaction and now waits for the final notification to arrive from Beneficiary's MPP.
Successful	Transaction is successfully completed.
Unsuccessful	Transaction is unsuccessful. The mobile payment application and/or the Beneficiary may decide to retry or abandon or take any other action.
Unknown	Transaction status is unknown. If the Notification has not been received, then either the Customer has responded but the response has been lost/delayed (possibly due to connection failure) or the Customer has not responded at all. In the former case the transaction would have been successful if the Bank was informed whereas in the later case the transaction would never be successful. Therefore when the Beneficiary does not receive notification the state is unknown.



List of Events for Beneficiary: *Pull*

Event	Description
Initiate Payment Transaction	Beneficiary initiates the payment transaction, using his mobile payment application, by sending the payment information.
Positive Notification	Beneficiary receives a confirmation of approval from Beneficiary's MPP indicating that the Customer has accepted the transaction.
Negative Notification	Beneficiary receives a refusal for the payment request from Beneficiary's MPP.
Timeout	Transaction is not completed within a specified period of time.

State Machine for Beneficiary: *Pull*





Transition Table for Beneficiary's FSM: *Pull*

<i>Event</i> \ <i>State</i>	<i>Start</i>	<i>Wait for Notification</i>	<i>Successful</i>	<i>Unsuccessful</i>	<i>Unknown</i>
Initiate Payment Transaction	<i>Send Payment transaction info to Beneficiary's MPP</i> ->Wait for Notification	Null (duplicate)	Null (duplicate)	Null (duplicate)	Null (duplicate)
Positive Notification	NA	<i>Notify Beneficiary</i> ->Successful	Null (duplicate)	Null (delayed)	Null (delayed)
Negative Notification	NA	<i>Notify Beneficiary</i> ->Unsuccessful	NA	Null (duplicate)	Null (delayed)
Timeout	NA	<i>Notify Beneficiary</i> ->Unknown	NA	NA	NA

Null (duplicate): ignore the duplicate event.

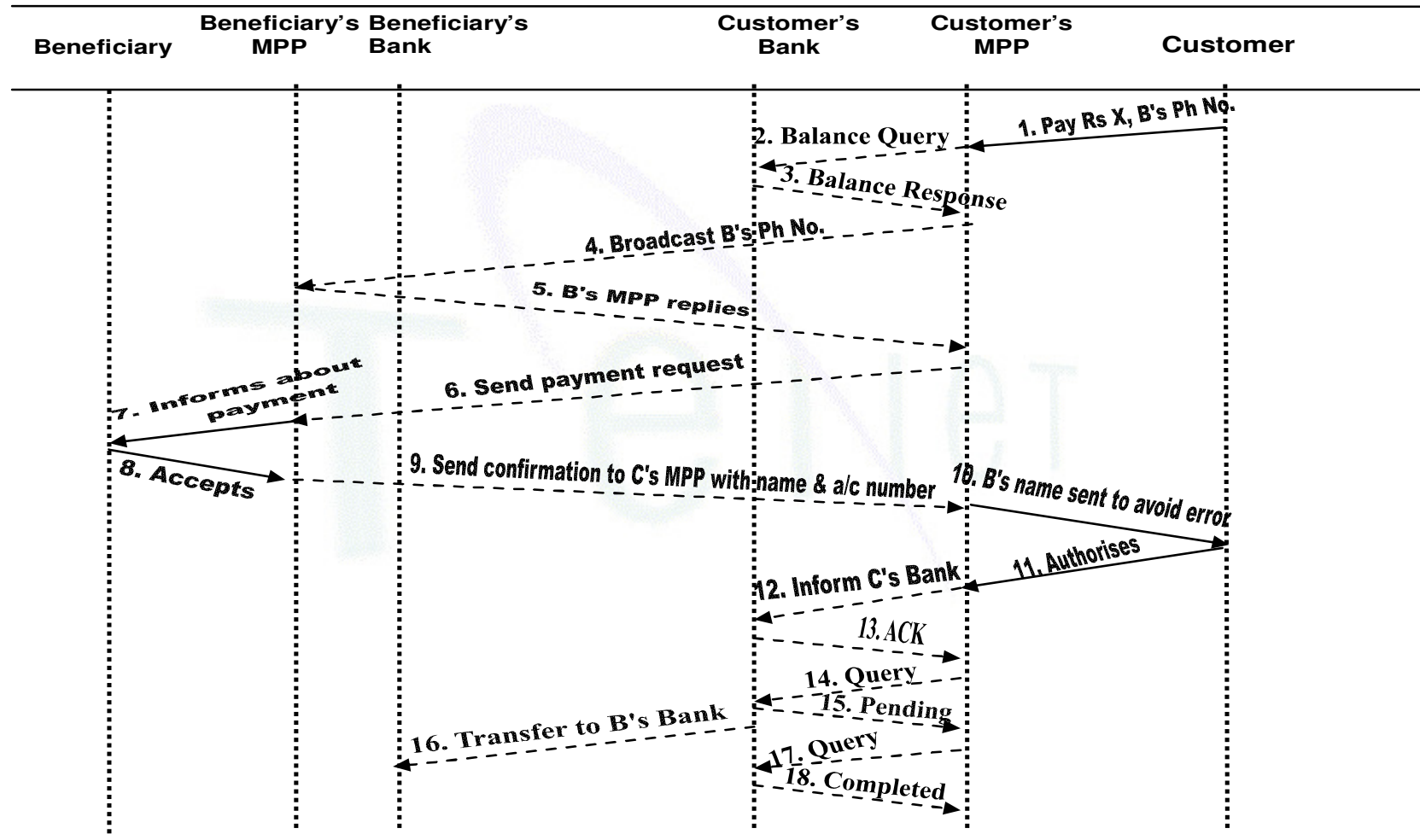
Null (delayed): ignore the delayed event.

NA: not applicable – this <state, event> pair should never occur. Usually indicates a software bug and should be logged and reported to the software developers.

- There are Finite State Machines, i.e.
 - List of States
 - List of Events
 - State Machine
 - Transition Table
- For each of the following
 - Beneficiary
 - Beneficiary's MPP
 - Customer's MPP
 - Customer



Push Process: Interaction Diagram



As for the *Pull* process, you will also find

- Finite State Machines, i.e.
 - List of States
 - List of Events
 - State Machine
 - Transition Table

For the entities that are involved in the mobile payment process

Error scenarios that can possibly occur in a mobile payment transaction

- Multiple Banks or Mobile Payment Providers are registered as default.
- Server of the default MPP which owns the default account number is down.
- Link between two MPPs or between MPP and Bank fails temporarily and a message can not be delivered.
- The initiating party switches off the phone in the midst of the transaction.

- Further information
 - URL for Mobile Payment Forum of India (MPFI)
www.mpf.org.in
- Conference paper
 - Mobile Payment Architectures for India
 - Kumar, Gonsalves, Jhunjhunwala, Raina
 - National Conference on Communications (NCC)
January, 2010, IIT Madras
- Acknowledgements
 - Technology Committee of the MPFI
 - Executive Committee of the MPFI
 - MPFI Members