

WHAT IS CLAIMED IS:

1. A computer-implemented method, comprising:

receiving, with at least one processor of a transaction service provider system, from a merchant system, an authorization request associated with a transaction in an electronic payment network, wherein the authorization request includes transaction data associated with the transaction, and wherein the transaction data includes an authorization origination time t_0 at which the authorization request is originated at the merchant system;

communicating, with the at least one processor of the transaction service provider system, the authorization request to an issuer system;

in response to communicating the authorization request to the issuer system, initiating, with the at least one processor of the transaction service provider system, a response timer associated with the transaction;

determining, with the at least one processor of the transaction service provider system, that the response timer satisfies a predetermined response time amount without receiving, from the issuer system, an authorization response associated with the authorization request;

in response to determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, determining, with the at least one processor of the transaction service provider system, an extended response time amount associated with the transaction by providing, as input to a machine learning model, the transaction data associated with the transaction and historical transaction data associated with at least one historical transaction associated with the issuer system, and receiving, as output from the machine learning model, the extended response time amount, wherein the historical transaction data includes at least one transit and processing time associated with the at least one historical transaction with the issuer system, and wherein the machine learning model provides the extended response time amount to ensure that an estimated total transit and processing time $STIP(t_R - t_0)$ for the transaction if stand-in processing (STIP) is invoked is less than an estimated maximum total transit and processing time $MAX(t_R - t_0)$ for the transaction if the transaction is successfully processed with or without invoking STIP;

after determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, receiving, with the at least one processor of the transaction service provider system, the authorization response from the issuer system before the response timer satisfies a sum of the extended response time amount and the predetermined response time amount, wherein the sum of the predetermined response time amount and the extended response time amount is less than a time amount of a merchant timeout in response to expiration of which the merchant system cancels the transaction in the electronic payment network; and

in response to receiving the authorization response from the issuer system before the response timer satisfies the sum of the extended response time amount and the predetermined response time amount, communicating, with the at least one processor of the transaction service provider system, to the merchant system, the authorization response, wherein the authorization response includes one of an authorization and a denial of the transaction in the electronic payment network.

2. The computer-implemented method of claim 1, wherein the transaction data includes at least one of the following parameters: a type of a point-of-sale (POS) terminal associated with the merchant system; a type of merchant associated with the merchant system; a country associated with the merchant system; a country associated with the issuer system; a merchant category code (MCC); a season; a time of day; or any combination thereof.

3. The computer-implemented method of claim 1, further comprising:

before determining the extended response time amount, verifying, with the at least one processor of the transaction service provider system, that the issuer system is eligible for an extended response time.

4. The method of claim 1, wherein the estimated maximum total transit and processing time $MAX(t_R - t_0)$ for the transaction if the transaction is successfully processed with or without invoking STIP is estimated based on an observed distribution of B minus A associated with the at least one historical transaction with the issuer system, and wherein, for the at least one historical transaction, A is a reversal transit time equal to a time when a reversal is received by the transaction service provider system minus a reversal origination time, and B is a time between the reversal and authorization equal to the reversal origination time minus the authorization origination time.

5. The method of claim 4, wherein the machine learning model provides the extended response time amount to ensure that an estimated total transit and processing time $STIP(t_R - t_0)$ for the transaction if STIP is invoked is less than an estimated maximum total transit and processing time $MAX(t_R - t_0)$ for the transaction if the transaction is successfully processed with or without invoking STIP according to the following Equation:

$$2C + D + t_{TO} < B - A \quad (12)$$

where $C = t_0 + t_{MA} + t_A + t_{AV}$, which is equal to a time at which the authorization response is received by the transaction service provider system minus the authorization origination time (t_0), $D = t_V$, t_{MA} is a network travel time between the merchant system and an acquirer system, t_{AV} is a network travel time between the acquirer system and the transaction service provider system, t_{VI} is a network travel time between the transaction service provider system and the issuer system, t_A is a processing time at the acquirer system, t_V is a processing time at the transaction service provider system, t_I is a processing time at the issuer system, and t_{TO} is a STIP timeout value for the issuer system.

6. A system, comprising:

at least one processor of a transaction service provider system programmed and/or configured to:

receive, from a merchant system, an authorization request associated with a transaction in an electronic payment network, wherein the authorization request includes transaction data associated with the transaction, and wherein the transaction data includes an authorization origination time t_0 at which the authorization request is originated at the merchant system;

communicate the authorization request to an issuer system;

in response to communicating the authorization request to the issuer system, initiate a response timer associated with the transaction;

determine that the response timer satisfies a predetermined response time amount without receiving, from the issuer system, an authorization response associated with the authorization request;

in response to determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, determine an extended response time amount associated with the transaction by providing, as input to a machine learning model, the transaction data associated with the transaction and historical transaction data associated with at least one historical transaction associated with the issuer system, and receiving, as output from the machine learning model, the extended response time amount, wherein the historical transaction data includes at least one transit and processing time associated with the at least one historical transaction with the issuer system, and wherein the machine learning model provides the extended response time amount to ensure that an estimated total transit and processing time $STIP(t_R - t_0)$ for the transaction if stand-in processing (STIP) is invoked is less than an estimated maximum total transit and processing time $MAX(t_R - t_0)$ for the transaction if the transaction is successfully processed with or without invoking STIP;

after determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, receive the authorization response from the issuer system before the response timer satisfies a sum of the extended response time amount and the predetermined response time amount, wherein the sum of the predetermined response time amount and the extended response time amount is less than a time amount of a merchant timeout in response to expiration of which the merchant system cancels the transaction in the electronic payment network; and

in response to receiving the authorization response from the issuer system before the response timer satisfies the sum of the extended response time amount and the predetermined response time amount, communicate, to the merchant system, the authorization response, wherein the authorization response includes one of an authorization and a denial of the transaction in the electronic payment network.

7. The system of claim 6, wherein the transaction data includes at least one of the following parameters: a type of a point-of-sale (POS) terminal associated with the merchant system; a type of merchant associated with the merchant system; a country associated with the merchant system; a country associated with the issuer system; a merchant category code (MCC); a season; a time of day; or any combination thereof.

8. The system of claim 6, wherein the at least one processor of the transaction service provider system is further programmed and/or configured to:

before determining the extended response time amount, verify that the issuer system is eligible for an extended response time.

9. A computer program product comprising at least one non-transitory computer-readable medium including program instructions that, when executed by at least one processor of a transaction service provider system, cause the at least one processor of the transaction service provider system to:

receive, from a merchant system, an authorization request associated with a transaction in an electronic payment network, wherein the authorization request includes transaction data associated with the transaction, and wherein the transaction data includes an authorization origination time t_0 at which the authorization request is originated at the merchant system;

communicate the authorization request to an issuer system;

in response to communicating the authorization request to the issuer system, initiate a response timer associated with the transaction;

determine that the response timer satisfies a predetermined response time amount without receiving, from the issuer system, an authorization response associated with the authorization request;

in response to determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, determine an extended response time amount associated with the transaction by providing, as input to a machine learning model, the transaction data associated with the transaction and historical transaction data associated with at least one historical transaction associated with the issuer system, and receiving, as output from the machine learning model, the extended response time amount, wherein the historical transaction data includes at least one transit and processing time associated with the at least one historical transaction with the issuer system, and wherein the machine learning model provides the extended response time amount to ensure that an estimated total transit and processing time $STIP(t_R - t_0)$ for the transaction if stand-in processing (STIP) is invoked is less than an estimated maximum total transit and processing time $MAX(t_R - t_0)$ for the transaction if the transaction is successfully processed with or without invoking STIP;

after determining that the response timer satisfies the predetermined response time amount without receiving, from the issuer system, the authorization response associated with the authorization request, receive the authorization response from the issuer system before the response timer satisfies a sum of the extended response time amount and the predetermined response time amount, wherein the sum of the predetermined response time amount and the extended response time amount is less than a time amount of a merchant timeout in response to expiration of which the merchant system cancels the transaction in the electronic payment network; and

in response to receiving the authorization response from the issuer system before the response timer satisfies the sum of the extended response time amount and the predetermined response time amount, communicate, to the merchant system, the authorization response, wherein the authorization response includes one of an authorization and a denial of the transaction in the electronic payment network.

10. The computer program product of claim 9, wherein the transaction data includes at least one of the following parameters: a type of a point-of-sale (POS) terminal associated with the merchant system; a type of merchant associated with the merchant system; a country associated with the merchant system; a country associated with the issuer system; a merchant category code (MCC); a season; a time of day; or any combination thereof.