

may rely on log-in credentials (e.g., username and password) to confirm a cardholder's identity. However, if the log-in credentials are compromised, another person could have access to the user's account.

**[0006]** These and other deficiencies exist. Accordingly, there is a need to provide users with an appropriate solution that overcomes these deficiencies to provide data security, authentication, and verification for contactless cards. Further, there is a need for both an improved method of activating a card and an improved authentication for account access.

## SUMMARY

**[0007]** Aspects of the disclosed technology include systems and methods for cryptographic authentication of contactless cards. Various embodiments describe systems and methods for implementing and managing cryptographic authentication of contactless cards.

**[0007a]** According to a first aspect, there is provided a server, comprising: a processor; and a memory, wherein the processor is configured to: send a transaction lockdown request to a client application comprising instructions for execution on a client device, the transaction lockdown request instructing the client application to disable a function of a contactless card associated with a user, receive a request to permit a transaction pre-approval within a time period, send a transaction notification, receive the transaction pre-approval, send, upon receipt of the transaction pre-approval within the time period, an allowance response for the transaction, and send, upon receipt of the transaction pre-approval after the time period, a disallowance response.

**[0007b]** According to a second aspect, there is provided a contactless card authentication method, comprising: receiving, by a client application comprising instructions for execution on a client device, a transaction lockdown request; disabling, by the client application, a

function of a contactless card after receiving the transaction lockdown request; sending, by a the client application ~~comprising instructions for execution on a client device~~, a request to a server to permit a pre-approval of a transaction ~~pre-approval~~ within a time period; receiving, by the client application, a transaction notification from the server; ~~requesting, by the client application, in response to the transaction notification;~~ receiving, by the client application, a tap from ~~a transmitting device~~ the contactless card on the client device, the tap providing a user authorization for the pre-approval of the transaction; sending, by the client application, the transaction pre-approval to the server; and receiving, by the client application, an allowance response from the server when the transaction pre-approval is received by the server within the time period, or a disallowance response from the server when the transaction pre-approval is received by the server after the time period.

[0007c] According to a third aspect, there is provided ~~a method, comprising: receiving, by a server, a request to permit a transaction pre-approval within a time period; sending, by the server, a transaction notification; receiving, by the server, the transaction pre-approval; and sending, by the server, an allowance response when the transaction pre-approval is received by the server within the time period or a disallowance response when the transaction pre-approval is received by the server after the time period.~~ a contactless card authentication system, comprising: a client application comprising instructions for execution on a client device including a processor and a card reader, wherein the client application is in wireless communication with a contactless card and the client application is in data communication with a server over a network, and wherein the client application is configured to: receive a transaction lockdown request, send a request to the server to permit a transaction approval within a time period, receive the transaction approval via an authentication tap from the

contactless card, send the transaction approval to the server, and receive an allowance response from the server, when the transaction approval is received by the server within the time period, or receive a disallowance response from the server, when the transaction approval is received by the server after the time period.

**[0008]** Embodiments of the present disclosure provide a contactless card authentication system, comprising: a client device including a processor and a card reader; and a client application comprising instructions for execution on the client device, wherein the card application is in data communication with a contactless card and the card application in data communication with an authentication server over a network, and wherein the client application is configured to: receive a transaction lockdown request; send a request to the authentication server to permit a transaction approval within a time period; receive the transaction approval via an authentication tap from the contactless card; send the transaction approval to the authentication server; and receive an allowance response from the authentication server, when the transaction approval is received by the authentication server within the time period, or receive a disallowance response from the authentication server, when the transaction approval is received by the authentication server after the time period.

## CLAIMS

~~What is claimed is:~~

1. A server, comprising:

a processor; and

a memory,

wherein the processor is configured to:

send a transaction lockdown request to a client application comprising instructions for execution on a client device, the transaction lockdown request instructing the client application to disable a function of a contactless card associated with a user,

receive a request to permit a transaction pre-approval within a time period,

send a transaction notification,

receive the transaction pre-approval,

send, upon receipt of the transaction pre-approval within the time period, an allowance response for the transaction, and

send, upon receipt of the transaction pre-approval after the time period, a disallowance response.

2. The server of claim 1, wherein:

the ~~processor is further configured to send a~~ transaction lockdown request is sent to ~~a the~~ client application in response to a user input, and  
~~—the transaction lockdown request instructs a client application to disable a function of the client application.~~

3. The server of claim 1, wherein the allowance response instructs ~~a~~the client application to enable a function of the ~~client application~~contactless card.
4. The server of claim 1, wherein the processor is further configured to modify the time period based on at least one selected from the group of a transaction type, a transaction amount, a transaction location, a merchant, an account type, an account information, and an account history.
5. The server of claim 1, wherein the processor is further configured to modify the time period based on at least one selected from the group of a location of ~~a~~the client device, a signal strength associated with ~~a~~the client device, a connection type, and a time of day.
6. The server of claim 1, further wherein the processor is further configured to reject all transactions upon failure to receive the transaction pre-approval within the time period.
7. The server of claim 1, wherein: the processor is configured to send  
the transaction ~~approval comprises a~~ notification ~~of~~responsive to a tap by ~~a~~the contactless card on the client device, and  
the contactless card is in data communication with the server through ~~one or more intermediary devices~~the client device.
8. The server of claim 1, wherein the processor is further configured to:  
receive a time period extension, and

extend the time period by an amount of time equal to the time period extension.

9. The server of claim 1, wherein the processor is further configured to:

receive a time period reduction, and

reduce the time period by an amount of time equal to the time period reduction.

10. A contactless card authentication method, comprising:

receiving, by a client application comprising instructions for execution on a client device,  
a transaction lockdown request;

disabling, by the client application, a function of a contactless card after receiving the  
transaction lockdown request;

sending, by a the client application comprising instructions for execution on a client  
device, a request to a server to permit a pre-approval of a transaction pre-approval within a  
time period;

receiving, by the client application, a transaction notification from the server;

~~requesting, by the client application, in response to the transaction notification;~~

receiving, by the client application, a tap from ~~a transmitting device~~ the contactless card  
on the client device, the tap providing a user authorization for the pre-approval of the  
transaction;

sending, by the client application, the transaction pre-approval to the server; and

receiving, by the client application, an allowance response from the server when the  
transaction pre-approval is received by the server within the time period, or a disallowance

response from the server when the transaction pre-approval is received by the server after the time period.

11. The method of claim 10, wherein the transaction lockdown request is provided by a user associated with the contactless card and the client device.~~further comprising:~~

~~receiving, by the client application, a transaction lockdown request; and  
—disabling, by the client application, a function of the transmitting device after receiving the transaction lockdown request.~~

12. The method of claim 10, further comprising enabling, by the client application, a function of the ~~transmitting device~~contactless card after receiving the allowance response.

13. The method of claim 10, further comprising:

prior to sending the request to the server to permit the transaction pre-approval within the time period, receiving, by the client application, a pre-approval option selection for a pre-approved transaction; and

~~prior to requesting authentication in response to the transaction notification,~~ matching, by the ~~client application~~server, the transaction notification to the pre-approved transaction.

14. The method of claim 13, ~~further comprising~~wherein:

matching the transaction notification to the pre-approved transaction includes matching a merchant and an amount,

~~wherein~~ the pre-approval option selection includes a transaction type, and

matching the transaction notification to the pre-approved transaction includes matching a transaction type of the transaction notification to the transaction type of the pre-approval option.

15. The method of claim 10, wherein the ~~transmitting device comprises a~~ contactless card ~~having comprises~~ a near field communication interface for communicating with the client application executing on the client device.

16. The method of claim 10, further comprising rejecting any transaction notification not matching the pre-approved transaction.

17. The method of claim 10, further comprising modifying, by the client application, the time period based on at least one selected from the group of a transaction type, a transaction amount, a transaction location, a merchant, an account type, an account information, an account history, a location of ~~a~~the client device, a signal strength associated with ~~a~~the client device, a connection type, and a time of day.

~~18. A method, comprising:~~

~~—receiving, by a server, a request to permit a transaction pre-approval within a time period;~~  
~~—sending, by the server, a transaction notification;~~  
~~—receiving, by the server, the transaction pre-approval; and~~  
~~—sending, by the server, an allowance response when the transaction pre-approval is received by the server within the time period or a disallowance response when the transaction pre-approval is received by the server after the time period.~~

19. The method of claim 18, further comprising:

- ~~—sending, by the server, a transaction lockdown request,~~
- ~~—wherein the transaction lockdown request instructs a client application to disable a function of the client application.~~

20. The method of claim 18, wherein the allowance response instructs a client application to enable a function of the client application after sending the allowance response.

18. A contactless card authentication system, comprising:

a client application comprising instructions for execution on a client device including a processor and a card reader,

wherein the client application is in wireless communication with a contactless card and the client application is in data communication with a server over a network, and

wherein the client application is configured to:

receive a transaction lockdown request,

send a request to the server to permit a transaction approval within a time period,

receive the transaction approval via an authentication tap from the contactless card,

send the transaction approval to the server, and

receive an allowance response from the server, when the transaction approval is received by the server within the time period, or

receive a disallowance response from the server, when the transaction approval is received by the server after the time period.

19. The system of claim 18, wherein the client application is further configured to:  
request transaction notifications from the server,  
receive a notification from the server, the notification being one of the transaction notifications, and  
display the notification on the client device.

20. The system of claim 19, wherein the request to the server to begin to allow the transaction approval is sent after receiving the notification from the server.