Member FAQ's on "Encryption of Interactive Messages**"**

Version 1.2

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Background

Currently, members connect to Exchange Trading System using Exchange provided NEAT Adapter / NEAT application or via Direct Connection through non-Encrypted data flow. In order to enhance the security posture, it is now proposed to encrypt these messages on an end-to-end basis.

Important Note: An interim coexistence phase for accepting both encrypted and non-encrypted message traffic is provided by the Exchange, after which Exchange shall discontinue the non-encrypted message flow.

Frequently Asked Questions (FAQs)

NON-TECHNICAL QUERY:

1. Which all segments are available for encrypted data flow?
   Currently, Exchange is providing encrypted data flow in COM, FO, CD, SLBM and CM segments in test market, Live and Simulation environments.

Segment	Releases in Test Environment	Releases in LIVE Environment	Releases in Simulated Environment
FO	Released on 31-Aug-23	07-October-2023	11-October-2023
CD	Released on 31-Aug-23	16-October-2023	18-October-2023
CM	Released on 27-Sep-23	06-November-2023	08-November-2023
CO	Released on 20-May-23	07-July-2023	29-August-2023
SLBM	Released on 20-Nov-23	04-December-2023	Not Available

2. What is the Exchange test market environment configuration parameters to test encrypted data flow.
   The details of parameters are provided under following link : https://ims.connect2nsccl.com/MemberPortal/view/testMrktHome.jsp or https://enit.nseindia.com/MemberPortal/view/testMrktHome.jsp

   Members are requested to configure below parameters for interactive session for non-encrypted and encrypted data flows in the test market.

Segment	Parameters		Non-encrypted Flow	Encrypted Flow
Commodity Derivatives	Gateway Router	IP Address	172.19.245.107	172.19.245.107
		Port	10264	10266
Futures & Options	Gateway Router	IP Address	172.19.245.107	172.19.245.107
		Port	10262	10267
Currency Derivatives	Gateway Router	IP Address	172.19.245.107	172.19.245.107
		Port	10261	10269
Capital Market	Gateway Router	IP Address	172.19.245.107	172.19.245.107
		Port	10263	10270
Securities Lending & Borrowing Market	Gateway Router	IP Address	172.19.245.107	172.19.245.107
		Port	10268	10281

3. What is the circular of interactive parameters applicable for Live environment.

Segment	Existing Interactive Parameters with Non-encrypted Flow	New Interactive Parameters with encrypted Flow
FO	NSE/MSD/45703	NSE/FAOP/58695
CD		NSE/CD/58901
CM		NSE/CMTR/59089
CO		NSE/COM/57478
SLBM		NSE/SLBS/59439

4. What is the Exchange Simulation market environment configuration parameters for encrypted data flow.
   Members are requested to configure below parameters for interactive session for non-encrypted and encrypted data flows in the Simulation market.

Segment	Parameters		Non-encrypted Flow	Encrypted Flow
Commodity Derivatives	**Gateway Router**	**IP Address**	172.19.245.108	172.19.245.108
		Port	10274	10276
Futures & Options	**Gateway Router**	**IP Address**	172.19.245.108	172.19.245.108
		Port	10272	10277
Currency Derivatives	**Gateway Router**	**IP Address**	172.19.245.108	172.19.245.108
		Port	10271	10279
Capital Market	**Gateway Router**	**IP Address**	172.19.245.108	172.19.245.108
		Port	10273	10280

TECHNICAL QUERY:

5. Which mode is used for AES256 Encryption?
   GCM mode of symmetric cryptography AES 256 bits is used for Encryption and Decryption.

6. Is authentication tag used in GCM mode?
   Authentication tag feature is currently not being used in GCM mode. We might explore this feature in future.

7. What should be the length of Cryptographic Initialization Vector (IV)?
   - The IV provided by Exchange is 16 bytes, however currently only 12 bytes are in use. Exchange does not set the IV length explicitly.
   - The default IV length used by AES256 is 12 bytes if not explicitly specified.
   - IV length can be checked using EVP_CIPHER_CTX_iv_length(ctx) function.

8. What if the message size is not in the multiple of 128 bits.
   Message size may or may not be in multiples of 128 bits.

9. What will be the first message after connection with Gateway?

The first message should always be Registration message (SECURE_BOX_REGISTRATION_REQUEST_IN).

10. What if a user sends messages other than SECURE_BOX_REGISTRATION_REQUEST_IN as first message to Gateway?
    If the user sends any message other than SECURE_BOX_REGISTRATION_REQUEST_IN, the Exchange will disconnect the user. Even heartbeat should not be sent before SECURE_BOX_REGISTRATION_REQUEST_IN

11. When should be the length of the order message be calculated?
    It is recommended to calculate length for the 22 byte network header post encryption.

12. Is there any encoding mechanism used for padding data?
    No encoding is used.

13. Which part of the packet should be encrypted?
    Packet excluding the 22-byte network header should be encrypted.

14. When should the md5 checksum be calculated?
    While sending data to exchange, calculate MD5 checksum first on actual order message and then Encrypt the packet. While receiving packet from Exchange, Decrypt the packet first and then verify MD5 checksum.

15. What will be the performance impact for Non-encrypted members?
    The members connecting on non-encrypted channel will be subject to encryption decryption library calls.

16. How can one implement Encryption changes to connect to Exchange?
    The detailed description and all the library calls are mentioned in the Annexure section of NNF protocol document for all segments. The link to access the API documents is as follows: https://www.nseindia.com/trade/platform-services-neat-trading-system-protocols

17. Will the members on Non-encrypted channel also update the message structure changes?
    The members connecting on non-encrypted channel can continue with existing message structures. Only the members opting to connect to the exchange via encryption channel need to apply all changes.

18. Which RHEL version is expected to use for implementation?
    Any RHEL version that supports OpenSSL 1.1.1 and TLS 1.3 can be used for implementation.

19. What changes in the network header for encrypted members?
    For members connecting on encrypted channel, sequence number from the order entry, modification, cancellation request message will be echoed back in response confirmation as well as rejection message.

20. Should a context be created every time we send a message?
    Context creation or Initialization should be done only once post connection with NET machine. Later for all the messages, only EVP_EncryptUpdate, EVP_DecryptUpdate should be called.

21. Can you summarize a detailed steps of login sequence via encryption which can be followed for any segment?
    Step 1: Member applications will connect to Exchange Gateway Router server on TCP using TLS 1.3 security protocol.

As part of TLS 1.3 security protocol, it is recommended that member applications verify Gateway Router server authenticity using the CA certificate provided by the Exchange.

Step 2.a: GR request and GR response messages will be sent and received by member applications using TLS 1.3 security protocol.

Step 2.b: GR Response: IP address, Port, Session key and cryptographic key and cryptographic IV (Initialization Vector) will be provided to member applications as part of GR response message.

Step 3: Post successful communication with Gateway router server, member applications will establish a new TCP connection with the allocated gateway server of Exchange.

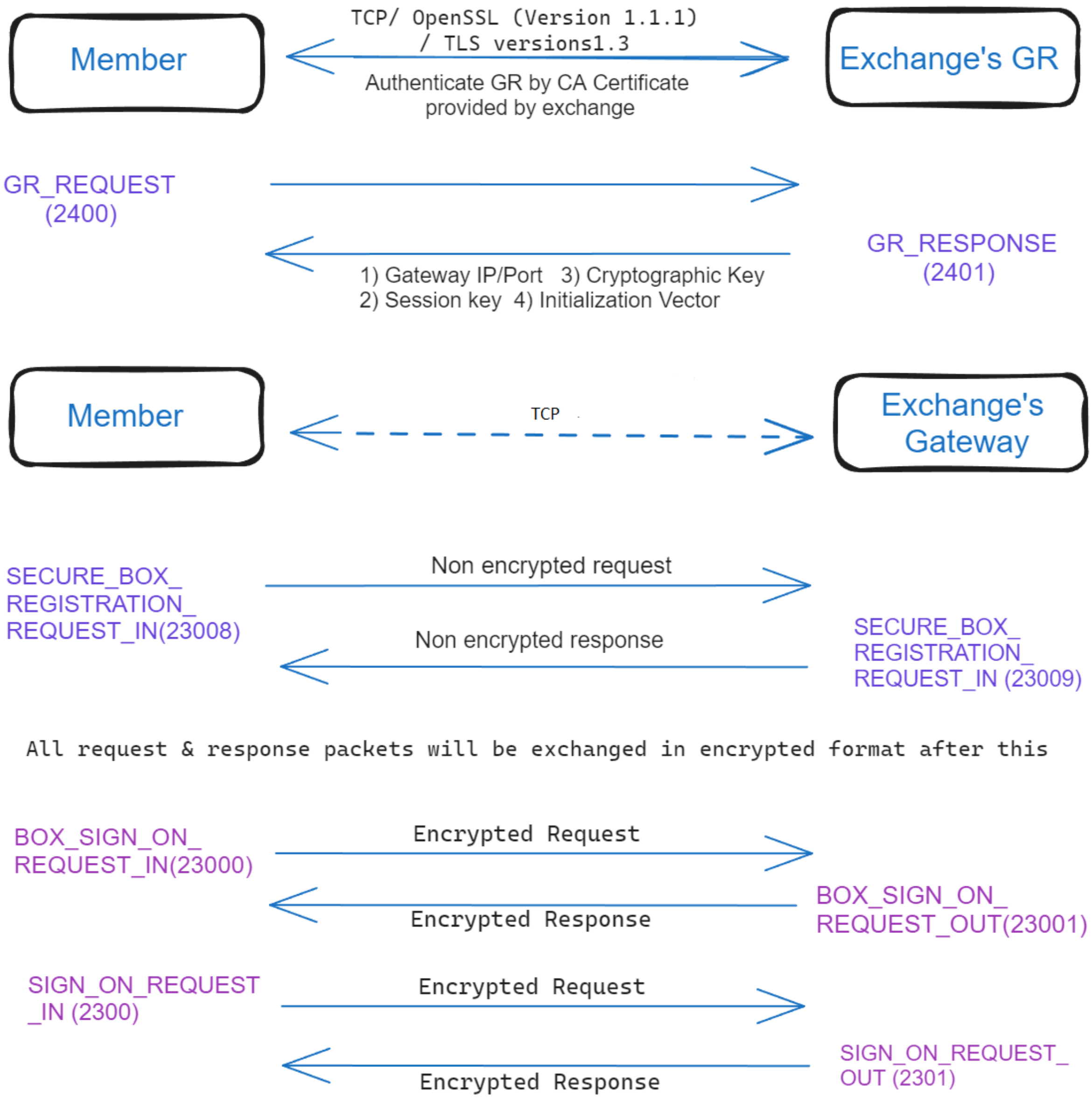
Step 4.a: Once TCP connection is established with Gateway Server IP & Port,
member will send SECURE_BOX_REGISTRATION_REQUEST (first message after connecting through TCP will be a non-encrypted special registration message (SECURE_BOX_REGISTRATION_REQUEST) to indicate that member application is using encryption)

Step 4.b: Exchange will send the SECURE_BOX_REGISTRATION_RESPONSE. If there is any error, then Error Code field in MESSAGE_HEADER will be populated with relevant error code in the SECURE_BOX_REGISTRATION_RESPONSE and the Box connection will be terminated.

Step 5.a: All the messages, after the first message, that are exchanged on this connection from both sides (member applications and Exchange) will be encrypted and decrypted using the 32-byte session key that was provided from Exchange at the time of Gateway Router handshake.

Step 5.b: BOX_SIGN_ON_REQUEST_IN(23000) will be the first encrypted message sent by member to exchange gateway. And exchange will respond with the encrypted BOX_SIGN_ON_REQUEST_OUT(23001), which member has to decrypt at his end.

ENCRYPTION LOGIN FLOW:



Member

TCP/ OpenSSL (Version 1.1.1)
/ TLS versions1.3

Authenticate GR by CA Certificate
provided by exchange

Exchange's GR

GR_REQUEST
(2400)

GR_RESPONSE
(2401)

1) Gateway IP/Port 3) Cryptographic Key
2) Session key 4) Initialization Vector

Member

TCP

Exchange's
Gateway

SECURE_BOX_
REGISTRATION_
REQUEST_IN(23008)

Non encrypted request

Non encrypted response

SECURE_BOX_
REGISTRATION_
REQUEST_IN (23009)

All request & response packets will be exchanged in encrypted format after this

BOX_SIGN_ON_
REQUEST_IN(23000)

Encrypted Request

Encrypted Response

BOX_SIGN_ON_
REQUEST_OUT(23001)

SIGN_ON_REQUEST
_IN (2300)

Encrypted Request

Encrypted Response

SIGN_ON_REQUEST_
OUT (2301)

***********END***********