z/OS V2.5 IBM Education Assistant

Solution Name: Resiliency Requirements for XCF Note Pad

Solution Element(s): z/OS BCP XCF

Agenda

- Trademarks
- Objectives
- Background
- Overview
- Usage & Invocation
- Interactions & Dependencies
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- Installation & Configuration
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Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - None

Objectives

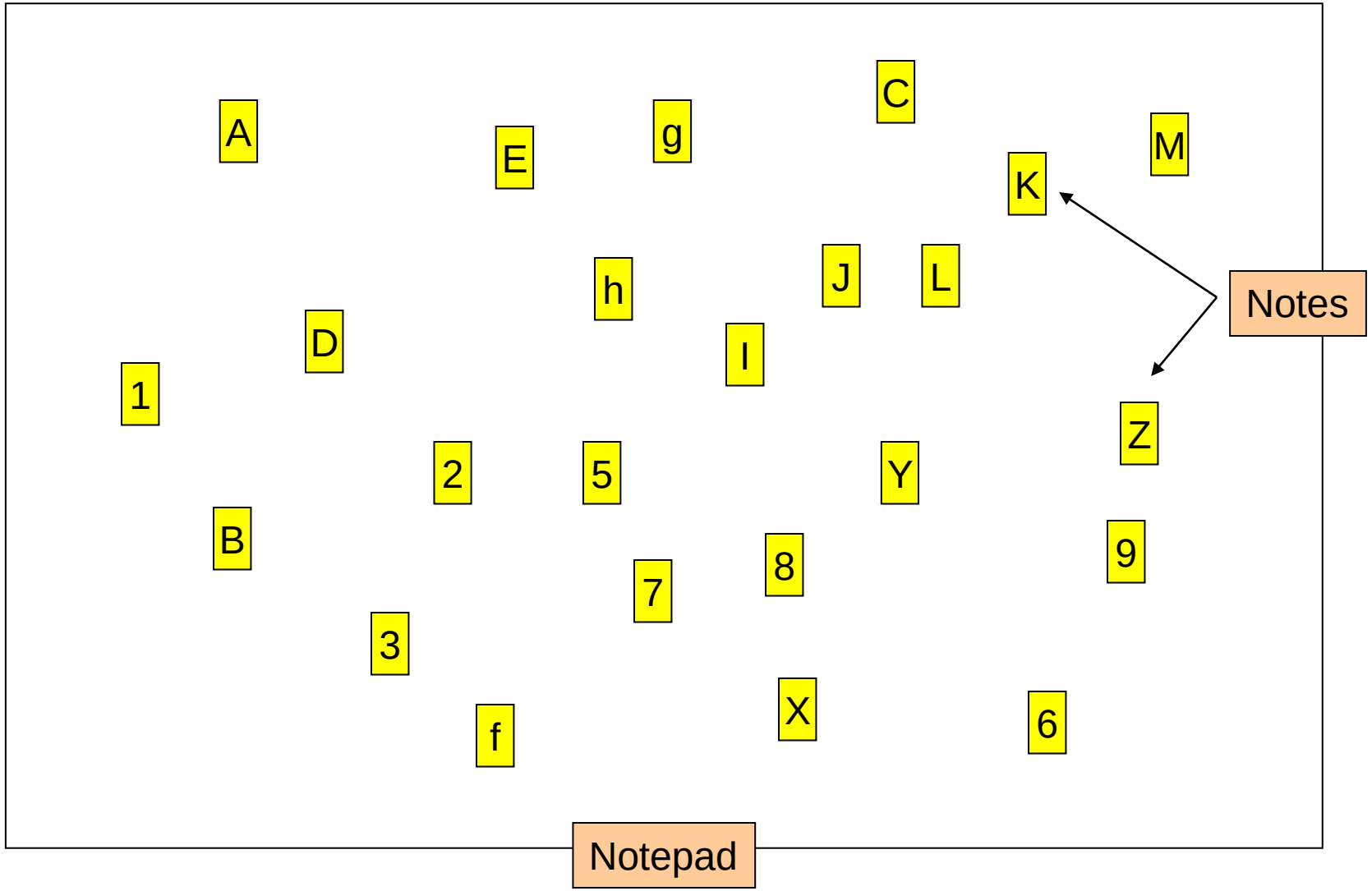
- Background on XCF Note Pad to provide some context
- Satisfying 2 requirements to improve XCF Note Pad resiliency
  - RFEID 140893 – Return code improvement if the note pad is unavailable for loss of connectivity across all systems with connectors to the note pad
  - RFEID 107306 – Dynamically increase the size (max number of notes) of the note pad

XCF note pad background

- Provide an interface to enable an application to easily store data in a coupling facility list structure
- Hopefully simpler, without traditional XES exploitation costs
  - XCF connects to structure, deals with XES events, failures
  - Applications can focus on “their” code
  - Probably needs to fit our notepad “model”
- Application need not run authorized
  - Need SAF authorization

Background

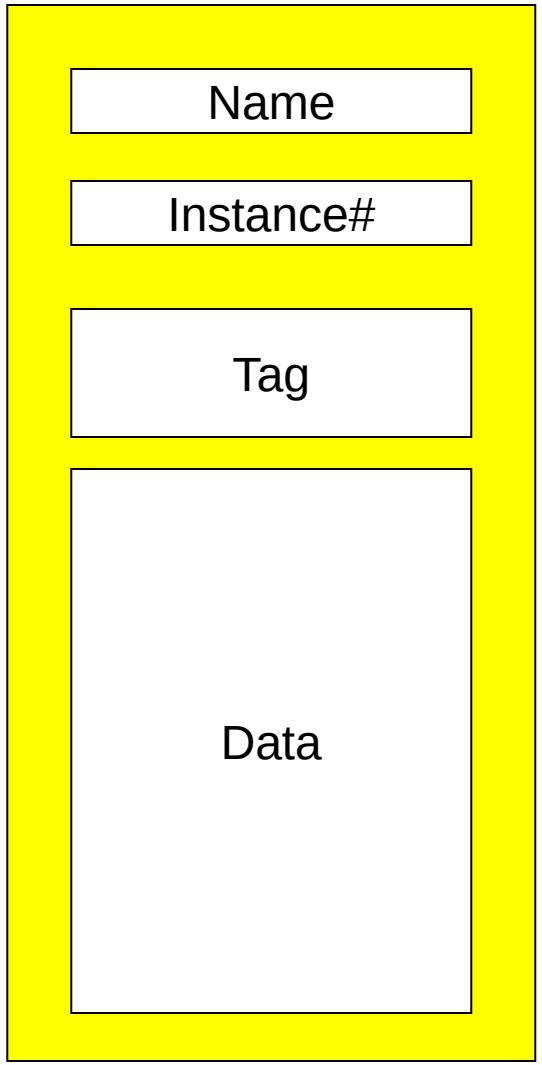
Note Pad



Background

Note in a note pad

XCF or User?
Arbitrary or ordered?



8 byte note name

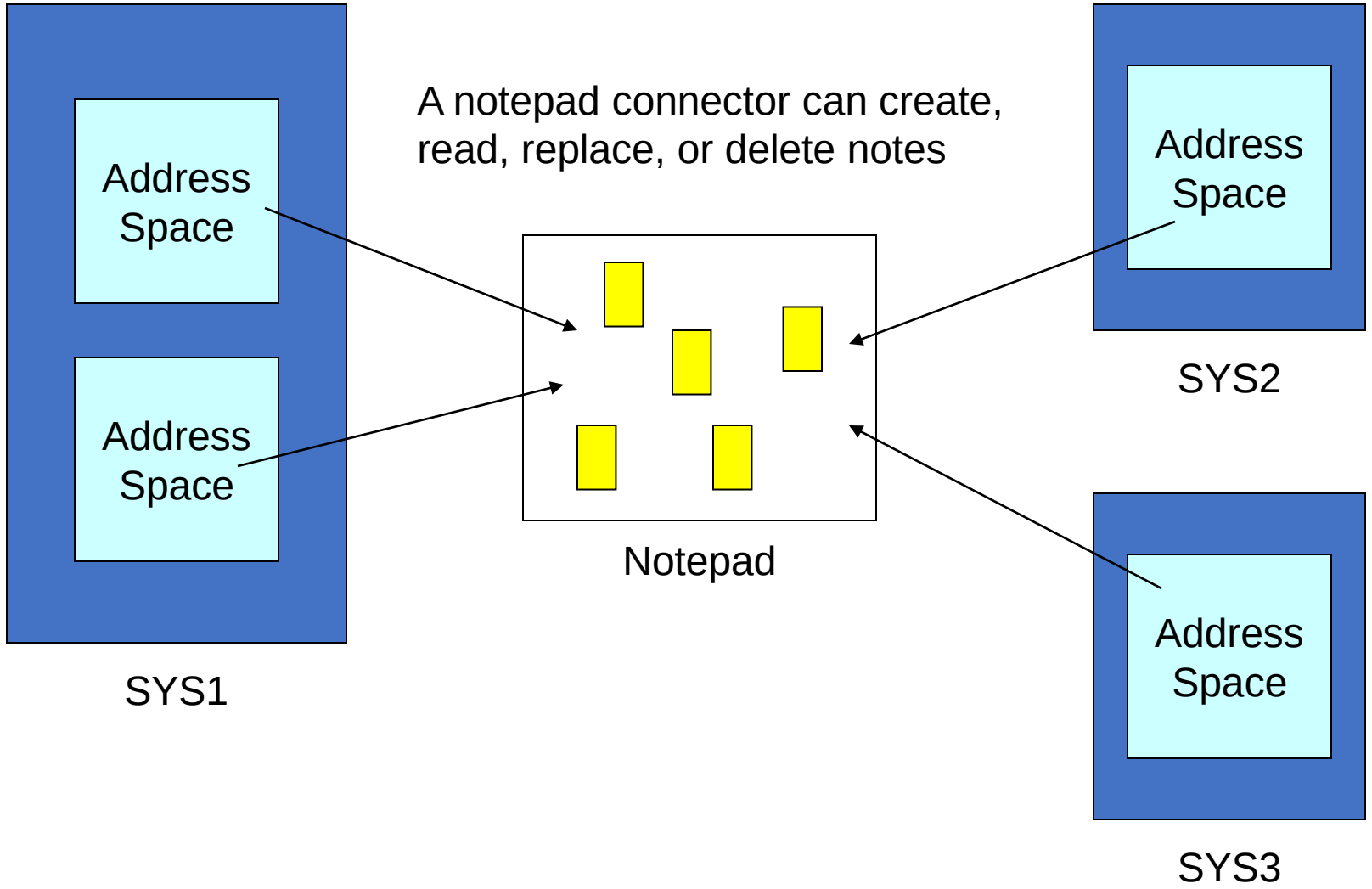
8 byte sequence #
for C/S

16 Bytes
of metadata

1024 Bytes
of data

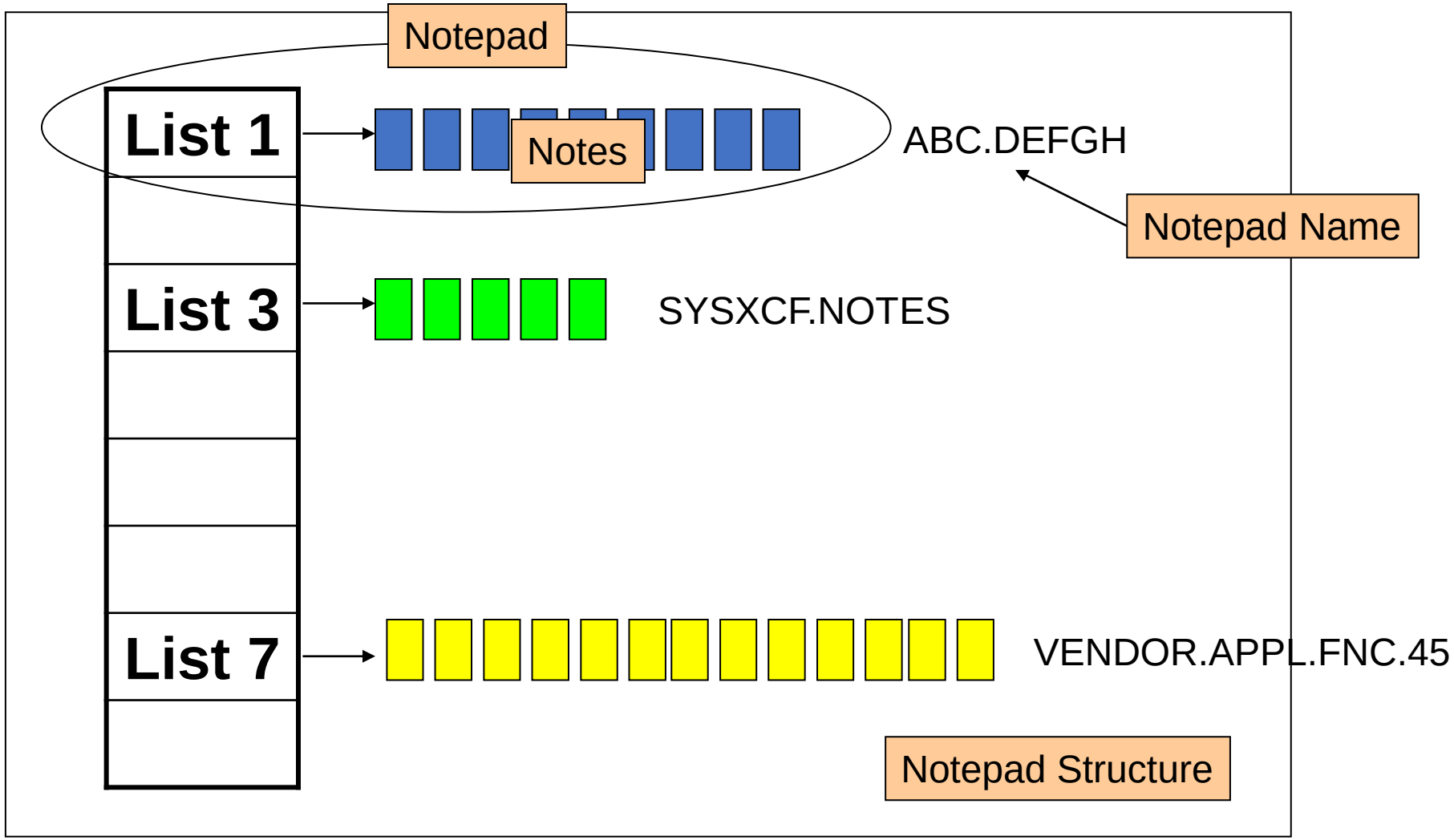
Background

Connections to a note pad



Background

XCF note pads



Background

- IXCNOTE macro
  - Create and delete a “notepad”
  - A notepad contains “notes”
  - A “note” is 1024 bytes of data identified by a “name”
  - A user “connects” to a notepad
  - A connector creates, reads, replaces, or deletes notes in a notepad

Overview

- Who (Audience)
  - Multi-system applications who are using XCF Note Pad services to store data in a coupling facility list structure without the traditional XES exploitation costs
- What (Solution)
  - Provide an interface to allow XCF Note Pad exploiters the capability to request that XCF automatically initiate note pad delete processing when XCF detects that all systems with connectors to the note pad have lost connectivity
  - Provide an interface to allow XCF Note Pad exploiters the capability to dynamically modify (increase or decrease) the maximum number of notes a note pad needs to hold without deleting the note pad and recreating it
- Wow (Benefit / Value, Need Addressed)
  - Resiliency: Allows note pad exploiters to use an existing protocol for fencing off use of the note pad when a total loss of connectivity is detected
    - Provides a trigger point to allow exploiters to perform their note pad recovery procedures
  - Resiliency: Allows note pad exploiters to react to demand for more notes to satisfy increased utilization with no interruption to availability

XCF note pad resiliency enhancements RFEID 140893

Problem - Return code improvement if the note pad is unavailable due to the loss of connectivity across all systems with connectors to the note pad

- Today – Loss of connectivity to the Coupling Facility hosting the note pad causes the note pad to be quiesced from the system that lost connectivity
  - RC=C, RSN=ixcnoteRsnQuiesced returned on IXCNOTE requests
    - Exploiters can pause to wait for the quiesce conditions to clear- IXCNOTE REQUEST=CONNECTION,REQTYPE=PAUSE or
    - Poll by continuing to issue the IXCNOTE request
  - No indication as to whether or not all systems with connectors are experiencing the loss of connectivity
    - Condition can last an indefinite amount of time
    - Exploiters would like to perform recovery procedures when this type of loss conn is experienced

XCF note pad resiliency enhancements RFEID 140893

Solution: Provide an API to allow applications the capability to request that XCF automatically delete the note pad when XCF detects that all systems with connectors to the note pad have lost connectivity

- Allows internal XCF note pad processing to use an existing delete protocol for fencing off use of the note pad
- Provides a trigger point to allow exploiters to perform their recovery procedures
  - RC=8,RSN=IxcNoteRsnNotePadNotExist returned on IXCNOTE requests or
  - When the connection is paused, it will be resumed with dr_ResumeCode=ixcynote_kResumeBeingDeleted in the aa_details of the answer area
- Possible recovery procedure
  - Fail over to a back up note pad hosted in another CF
  - Delete the old note pad
  - Reestablish a new back up
- Cleans up old note pad

Usage & Invocation

```
IXCNOTE  REQUEST=NOTEPAD
              NOTEPAD=xnotepad
         ┌─── REQTYPE=CREATE
         │       DESCRIPTION=xdescription
         │     [ INFO=xinfo | 0 ]
         │       #NOTES=x#notes
         │    ┌  MULTIWRITE=NO
         │    └  MULTIWRITE=YES
         │    ┌  [ DUPLEX=AVOID ]
         │    └  [ DUPLEX=FAVOR ]
         │    ┌  [ INSTCOMP=DISCRETIONARY ]
         │    └  [ INSTCOMP=REQUIRED ]
         │    ┌  [ TAGGING=XCF ]
         │    └  [ TAGGING=USER ]
         │    ┌  [ TRACKTAG=NO ]
         │    │  [ TRACKTAG=CURRENT ]
         │    └  [ TRACKTAG=LIFETIME ]
         │    ┌  [ LOSSCONNDELETE=NO ]
         │    └  [ LOSSCONNDELETE=YES ]
         ├─── REQTYPE=QUERY
         │
         └─── REQTYPE=DELETE
                [ ETODCREATED=xetodcreated | ANY ]
                  CONDITIONS=NO
                  CONDITIONS=YES
                      MUSTBE= EMPTY | UNUSED
                [ TIMEOUT=xtimeout | XCF
```

A new LOSSCONNDELETE keyword under REQTYPE=CREATE allows XCF to delete the note pad when all systems with connectors to the note pad have lost connectivity to the CF hosting the note pad.

Usage & Invocation

- IXCNOTE
  - New LOSSCONNDELETE keyword is provided on the IXCNOTE REQUEST=NOTEPAD, REQTYPE=CREATE
  - LOSSCONNDELETE=YES/NO – optional keyword input indicating whether XCF can automatically initiate note pad delete processing when all systems with connectors to the note pad have lost connectivity to the coupling facility hosting the note pad
    - NO (default) - XCF will not automatically initiate note pad delete processing when all systems with connectors to the note pad have lost connectivity to the coupling facility hosting the note pad. (No change in behavior – functions as it does today)
    - YES – XCF will automatically initiate note pad delete processing when all systems with connectors to the note pad have lost connectivity to the coupling facility hosting the note pad.

Important: This processing can occur even if the loss of connectivity is transient and some systems with connectors to the note pad eventually regain connectivity to the CF after the delete process is initiated.

XCF note pad resiliency enhancements RFEID 107306

Problem - Periods of high demand and utilization of a note pad creates situations where the maximum number of notes is reached (note pad full) and an increase in size on demand is needed to avoid disruption to the availability of the note pad.

- Today – Requests to WRITE or CREATE new notes will fail when the note pad has reached the maximum number of notes specified on the IXCNOTE CREATE
  - RC=8, RSN=ixcnoteRsn#NotesExceeded returned on IXCNOTE requests to WRITE or CREATE notes
  - Short of deleting the note pad and creating it all over again, the maximum number of notes allowed for a note pad cannot be changed dynamically after the note pad is created.
  - Exploiters must use IXCNOTE REQUEST=NOTEPAD,REQTYPE=CREATE to create a note pad with a higher maximum number of notes (#NOTES) needed by the note pad.
    - Deleting the old note pad and creating a new note pad causes the note pad to be unavailable and requires complex application code to manage the transition

XCF note pad resiliency enhancements RFEID 107306

Solution: Provide an API to allow applications the capability to dynamically modify (increase or decrease) the number of notes a note pad needs to hold without deleting the note pad and recreating it

- Exploiter / Application controlled:
  - The exploiter can anticipate in advance or react to demand for more notes to satisfy increased utilization with no interruption of availability to the note pad
  - Exploiter can increase note pad capacity temporarily to handle “spikes” then return (decrease) to normal working set
  - Dynamically respond to constrained note pad conditions due to structure altering
  - Exploiter / Application can use up all the available List structure resources in a host note pad structure

XCF note pad resiliency enhancements RFEID 107306

```
IXCNOTE  REQUEST=NOTEPAD
         NOTEPAD=xnotepad
         REQTYPE=CREATE
            DESCRIPTION=xdescription
          [ INFO=xinfo | 0 ]
           #NOTES=x#notes
          [ MULTIWRITE=NO
          [ MULTIWRITE=YES
          [ DUPLEX=AVOID ]
          [ DUPLEX=FAVOR ]
          [ INSTCOMP=DISCRETIONARY ]
          [ INSTCOMP=REQUIRED ]
          [ TAGGING=XCF ]
          [ TAGGING=USER ]
          [ TRACKTAG=NO ]
          [ TRACKTAG=CURRENT ]
          [ TRACKTAG=LIFETIME ]
         REQTYPE=QUERY
         REQTYPE=DELETE
            [ ETODCREATED=xetodcreated | ANY ]
             CONDITIONS=NO
             CONDITIONS=YES |
                 MUSTBE= EMPTY | UNUSED
           [ TIMEOUT=xtimeout | XCF ]
         REQTYPE=MODIFY
            #NOTES=x#notes
```

A new IXCNOTE REQUEST=NOTEPAD REQTYPE=MODIFY provides an API to dynamically change the #NOTES defined to the note pad.

XCF note pad resiliency enhancements RFEID 107306

IXCNOTE REQUEST=NOTEPAD REQTYPE=MODIFY

- Increase #NOTES

  RC0 - Completed successfully where the #notes requested on the MODIFY becomes the new maximum number of notes that the note pad can hold

  XCF will not “over commit” list entries to satisfy the MODIFY request.

  e.g., XCF will not allow the sum of the note limits (#NOTES) for all the note pads in the structure to exceed the total number of notes available in the structure.

- Decrease #NOTES

  RC0 – Completed successfully where the #notes requested on the MODIFY becomes the new maximum number of notes that the note pad can hold

  XCF will not complete the request if the #NOTES requested is *less than* the number of notes currently in use by the note pad

Interactions & Dependencies

- Software Dependencies
  - To exploit the new note pad resiliency features, IBM suggests that all systems be at a release or service level that supports the new note pad resiliency features. However, the minimum requirement is:
    - All systems with connectors to the note pad must be at a release or service level that supports the new note pad resiliency features, and
    - There must always be a system in the sysplex at a release or service level that supports the new note pad resiliency features (covers system failure scenarios for the systems with connectors to the note pad)
  - z/OS V2R3, V2R4, and V2R5 with PTFs for exploitation/coexistence APAR OA60571
  - Target Cor-close by 8/20/21 – To make final GA of V2R5
  - New QUREQFEATURES flag QuReqRfIxcNoteResiliency returned on IXCQUERY REQINFO=FEATURES can be used to determine if the system supports the new note pad resiliency features.
- Hardware Dependencies
  - None
- Exploiters
  - None

Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the Plex must be at the new z/OS level: No
- List any toleration/coexistence APARs/PTFs.
  - Exploitation/Coexistence APAR OA60571
    - Available on V2R3, V2R4, and V2R5
    - Target Cor-close 8/20/2021

Installation & Configuration

- Install PTFs for APAR OA60571

Summary

- Provided an update to the IXCNOTE interface to allow XCF Note Pad exploiters the capability to request that XCF automatically initiate note pad delete processing when XCF detects that all systems with connectors to the note pad have lost connectivity
- Provided an update to the IXCNOTE interface to allow XCF Note Pad exploiters the capability to dynamically modify (increase or decrease) the maximum number of notes a note pad needs to hold without deleting the note pad and recreating it

Appendix

- Publications
  - z/OS: MVS Programming: Sysplex Services Guide
  - z/OS: MVS Programming: Sysplex Services Reference
  - z/OS: MVS System Messages Vol. 10 (IXC-IZP)
    - IXC473I
    - IXC443I