

IBM Education Assistance for z/OS V2R2

Item: Signalling Transport Class Simplification, Part 1
Element/Component: XCF



Agenda

- Trademarks
- Presentation Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Migration & Coexistence Considerations
- Presentation Summary
- Appendix



Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.

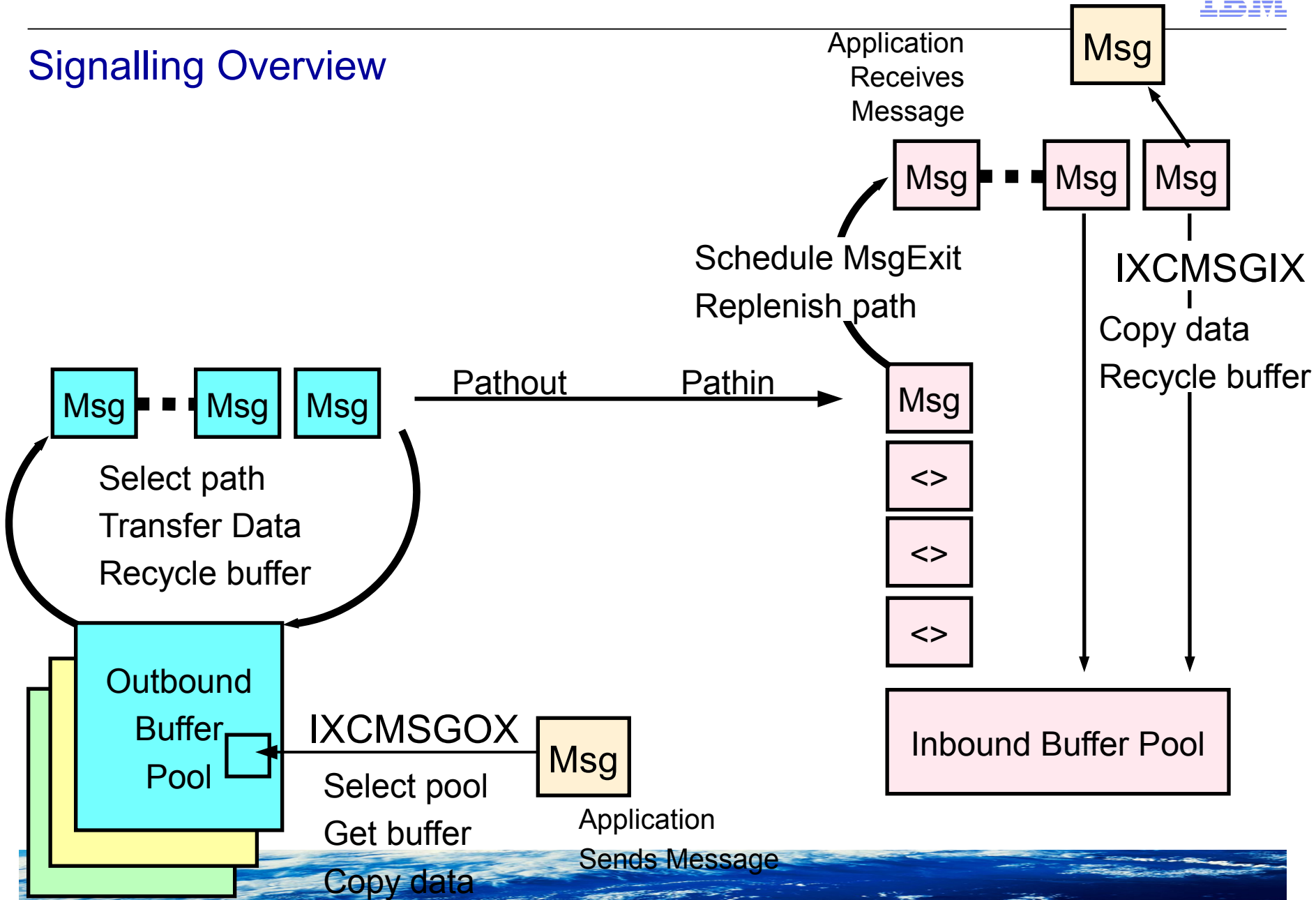


Presentation Objectives

- Background on Transport Classes
- Motivation for “eliminating” them
- What’s needed to “eliminate” them
- What is being delivered in z/OS V2R2



Signalling Overview



Overview

- Problem Statement / Need Addressed

- XCF needs to improve management of signal resources to reduce likelihood of a “bad” member impeding delivery of signals to others

- Solution

- Message isolation
- Aggressive migration

- Benefit / Value

- Improved resiliency
- Reduce risk of sympathy sickness
- *Possibly* improved throughput



Solution Component – Message Isolation

- Prevent a target member from consuming so much signal resource that it impedes the delivery of signals to other members
 - Primary issue is consumption of inbound signal buffers
 - Secondary issue is consumption of common storage
 - Tertiary issue is consumption of real frames
- Once a message is accepted by the signal service, it must be delivered
 - The inbound side has no ability to refuse messages
 - So the sending system must be the one to reject incoming requests targeted to an offending member
- The inbound side will identify ill behaved members and “isolate” them by telling other systems to stop accepting signals for that member (and when to resume sending)



Consequences of being “message isolated”

- XCF either delays or rejects signals targets to an isolated member
 - By default, the reason is “no buffer”
 - “*no buffer for you*”. Sends to non-isolated members are still accepted.
 - Exploiters can optionally request unique reason code of “isolated”
 - Specify MSGISO=MSGORSN when issuing IXCJOIN to join group
 - Delayed signals are held by sending system until the target member becomes “not isolated” or the message completes (timeout, cancel, ...)
- If XCF accepts a signal, but the target member is isolated before the signal can be queued to a signal path, the signal is held until the member becomes “not isolated” or terminates



Consequences of being “message isolated”

- So impacted senders may see more rejects, delays, or timeouts
 - But this is the intended behavior
 - If a member is not able to participate effectively, there will likely be impacts to its peers
- We try to minimize the scope of impact to the application (group)
 - In the past, all group members had potential for impact (due to no buffer conditions or transfer delays)
 - But signals for unrelated applications (groups) should flow freely
- Note! There can still be impact to other applications
 - Others may depend on the services of the offending application
 - There may be (are) scenarios that could defeat the XCF algorithms



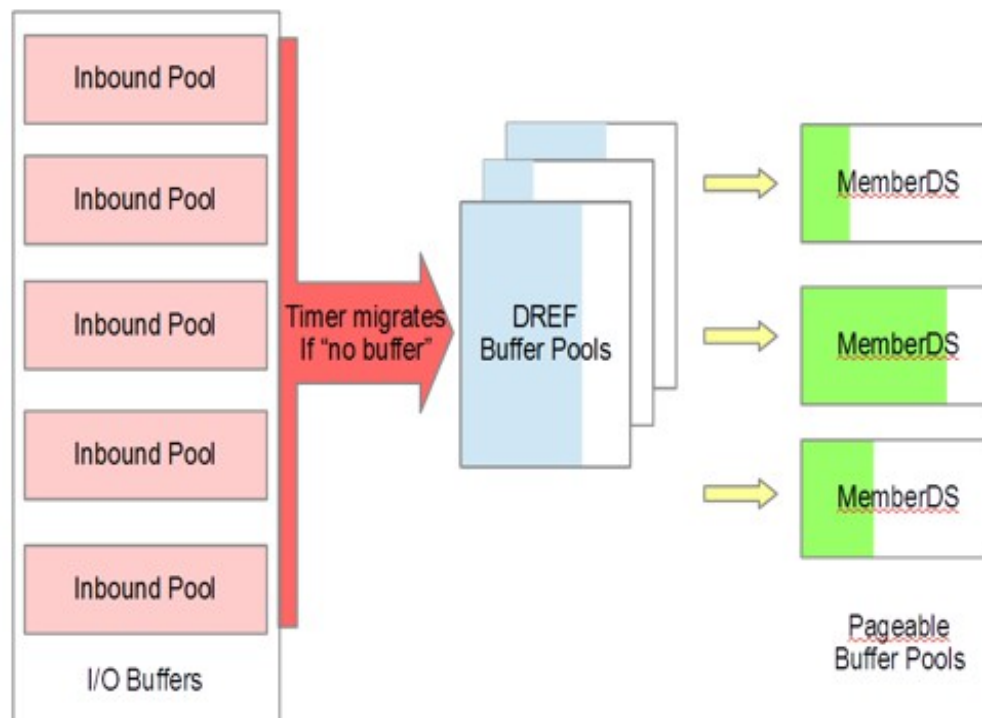
Solution component - Aggressive Migration

- “Migration” is the process by which XCF moves a signal out of an I/O buffer into alternate storage areas to maintain signal flow
 - The signal is delivered to the target member as promised
 - The I/O buffer can be used to receive another signal
- XCF has done migration for many years
 - But migration can defeat MAXMSG protections
 - So the migration rate has been intentionally slow
- With the ability to use “message isolation” to stop the flow of messages to a member that is not keeping up, XCF can increase the rate of migration



Interplay between aggressive migration and message isolation

Objective is to ensure that a target member with a growing backlog of messages gets isolated before storage resources are exhausted



System Messages show isolation and impact

Systems with Impacted Member

```
IXC637I GROUP A0000000 MEMBER SY2 JOB XCAT0C01 ASID 0025
MEMTOKEN 03000008 00150001 ON SYSTEM SY2 ISO#: 3.1
MESSAGE ISOLATION IMPACT FOR SYSTEM SY1 RPT#: 1
  IMPACTED   : 02/02/2015 17:28:46.515464 SEQ#: 1
  RESUMED    :                               SEQ#: 0
  DELAYED    :                               #MSG: 0
  REJECTED   : 02/02/2015 17:28:47.023326 #MSG: 977
```

```
*IXC440E SYSTEM SY1 IMPACTED BY ISOLATED XCF GROUP MEMBERS ON SYSTEM
SY2
```

```
IXC637I GROUP A0000000 MEMBER SY2 JOB XCAT0C01 ASID 0025
MEMTOKEN 03000008 00150001 ON SYSTEM SY2 ISO#: 3.1
MESSAGE ISOLATION IMPACT FOR SYSTEM SY1 RPT#: 2
  IMPACTED   : 02/02/2015 17:28:46.515464 SEQ#: 1
  RESUMED    : 02/02/2015 17:28:58.285585 SEQ#: 1
  DELAYED    : 02/02/2015 17:28:54.077545 #MSG: 15300
  REJECTED   : 02/02/2015 17:28:49.164130 #MSG: 5100
```

System with Isolated Member

```
IXC638I GROUP A0000000 MEMBER SY2 JOB XCAT0C01 ASID 0025
MEMTOKEN 03000008 00150001 ON SYSTEM SY2 ISO#: 3.1
MESSAGE ISOLATION STATUS FOR SYSTEM SY2 RPT#: 1
  ISOLATED   : 02/02/2015 17:28:44.644972 SEQ#: 1
  RESUMED    :                               SEQ#: 0
  DELIVERYQ  : 02/02/2015 17:28:38.855734 #MSG: 5084
  LAST MSGX  :                               SEQ#: 17
```

```
*IXC645E SYSTEM SY2 HAS ISOLATED XCF GROUP MEMBERS
```

```
IXC638I GROUP A0000000 MEMBER SY2 JOB XCAT0C01 ASID 0025
MEMTOKEN 03000008 00150001 ON SYSTEM SY2 ISO#: 3.1
MESSAGE ISOLATION STATUS FOR SYSTEM SY2 RPT#: 2
  ISOLATED   : 02/02/2015 17:28:44.644972 SEQ#: 1
  RESUMED    : 02/02/2015 17:28:58.285542 SEQ#: 1
  DELIVERYQ  :                               #MSG: 0
  LAST MSGX  : 02/02/2015 17:28:58.285631 SEQ#: 5101
```



DISPLAY XCF,GROUP,grpname,member

```

IXC333I 17.28.54 DISPLAY XCF 485
  INFORMATION FOR GROUP A0000000
    * INDICATES PROBLEM, ! INDICATES SEVERE PROBLEM
  MEMBER NAME:      SYSTEM:      JOB ID:      STATUS:
    SY1              SY1          XCAT0C01      IMPACTED BY MISO
    !*SY2            SY2          XCAT0C01      MESSAGE ISOLATED

  INFO FOR GROUP A0000000 MEMBER SY2 ON SYSTEM SY2
    * INDICATES PROBLEM, ! INDICATES SEVERE PROBLEM

  FUNCTION: Not Specified
  MEMTOKEN: 03000008 00150001      ASID: 0025      SYSID: 03000000
    INFO: CURRENT      COLLECTED: 02/02/2015 17:28:54.63518
    .....
  SIGNALLING SERVICE
    MSGO ACCEPTED:      0      NOBUFFER:      0

    MESSAGE TABLE:      SENDPND  RESPPND  COMPLTD  MOSAVED  MISAVED
                        0          0          0          0          0

    MSGI RECEIVED:      0      PENDINGQ:      5084
    MSGI XFER CNT:      5100  XFERTIME:      142998

    MSGI PENDINGQ:      IO BUFFERS      DREF      PAGEABLE  CRITICAL
                        3020      1105      959          0
    SYMPATHY SICK:      0

    !*MISO SY2      : 02/02/2015 17:28:44.644972 MI SEQ:      1
    SIMP SY1      : 02/02/2015 17:28:46.515464 DR NUM:      14K 5100
    ITEM 01D98190: 02/02/2015 17:28:36.096177 ME SEQ:      17
    ITEM 01D39190: 02/02/2015 17:28:38.855734 ME SEQ:      5100

    MISO SY2      : 02/02/2015 17:28:44.644972 MI 00:00:13.640569 ME RUNNING
    SIMP SY1      : 02/02/2015 17:28:46.515464 DR 00:00:11.770120 ME RUNNING
    
```

New status inserts indicate when an active member is isolated or impacted

Migration has moved signals to DREF and pageable

SY2 Isolated

SY1 Impacted
>14K delayed
5100 rejects



When windows close, can see duration of isolation and impact

External Interfaces

- IXCJOIN
 - New MSGISO keyword to request “isolated” instead of “no buffer”
- IXCMMSGO, IXCMMSGOX, IXCYCON
 - New “isolated” reason code
- Various query services will indicate when member is isolated or impacted (these are what DISPLAY XCF, GROUP uses)
 - IXCQUERY / IXCYQUAA
 - IXCMG / IXCYAMDA



Usage & Invocation

- New behaviors only apply to systems running z/OS V2R2
 - Does apply to local message traffic, though we seldom see issues there
 - So not likely to see any new behavior until there are at least two systems running z/OS V2R2 in the sysplex
- Simply IPLing system with z/OS V2R2 activates the new behavior
 - When communicating with down level system, the old behaviors apply
 - And so derive no benefit
 - Down level systems do not require any compatibility support



Interactions & Dependencies

- Software Dependencies
 - None
- Hardware Dependencies
 - None
- Exploiters
 - N/A. These are internal changes to the behavior of XCF.
 - Exploiters can optionally request to be made aware of distinctions between the traditional “no buffer” reject vs the new “isolated” reject
 - For those that do not, and who also issue messages to complain about XCF “no buffer” conditions, those messages may be misleading



Migration & Coexistence Considerations

- Be aware:

- On z/OS V2R2 systems, XCF might now selectively indicate “no buffer” for messages targeted to an isolated member
- Some XCF exploiters issue messages to complain when their msgout request is rejected for a “no buffer” condition
 - In the past, you might then go look at your MAXMSG specifications
 - But with z/OS V2R2, those exploiter messages might be the result of the target member being “message isolated”
 - So with z/OS V2R2, you should first look to see whether message isolation might apply
- XCF query services (and therefore measurement products such as RMF) only indicate “no buffer” for true MAXMSG constraints



Presentation Summary

- When z/OS V2R2 is IPLed, XCF monitors will identify and isolate an ill behaved member in an attempt to prevent that member from impacting XCF's ability to provide timely delivery of signals to other members
- Expect improved resiliency and availability of signal services



Appendix: Publications

▪ Publication references

- SA38-0658 *z/OS MVS Programming: Sysplex Services Reference*
- SA23-1400 *z/OS MVS Programming: Sysplex Services Guide*
- SA380-0677 *z/OS MVS System Messages Volume 10 (IXC-IZP)*
- GA32-0938 *z/OS MVS Data Areas Volume 4 (IRARMCTZ-LCT)*
- SA38-0665 *z/OS MVS System Codes*
- GA32-0904 *z/OS MVS Diagnosis Reference*



Appendix: Terminology

- Message isolation

- The process by which XCF monitoring identifies a member that is not processing its signals in a timely manner and then arranges to have sending systems reject or delay messages targeted to that member.

- Isolated member

- A target member whose signals are being rejected or delayed by XCF due to message isolation. We say the member is “message isolated”.

- Impacted member

- A sending member whose signals are being rejected or delayed because the target member is message isolated.



Appendix: Terminology

- Isolation window

- The period of time during which a target member is message isolated

- Impact window

- The period of time during which a sending member was impacted by message isolation of a given target member.
 - Member impact window – an impact window for a given sending member
 - System impact window – an impact window for a given sending system is the union of the set of member impact windows for all the members on that system

Notes

Isolation windows do not necessarily induce impact windows.

Impact windows can span isolation windows.



Appendix: Messages

- IXC638I – documents isolation window for given member
- IXC637I – documents impact window for given member
 - By default, these messages are issued to hardcopy log
 - Issued at start and end of a window, with periodic refreshes should the window persist long enough
- IXC645E – alerts operator to existence of isolated members
- IXC440E – alerts operator to existence of impacted members
 - Issued as highlighted messages
 - Persist until no members on the issuing system qualify
 - Investigate with D XCF,G and/or review of IXC637I and IXC638I

