Preparing for the Future Moving to the IMS Common Service Layer

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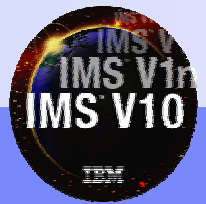
IMS Advanced Technical Support



Agenda

- IMS Version 10 New Function using Common Service Layer (CSL)
- Common Service Layer (CSL) Overview
- Overview of Operations Manager (OM)
- Overview of Resource Manager (RM)
- Setting up the CSL environment

IMS Version 10 New Functions using CSL

- Dynamic Resource Definition (DRD)
- Manage Resources Application
- Dynamic Updates of MSC Resources
- OM Audit Trail
- Batch SPOC Utility
- Command Enhancements
  - QUERY for Work, Related Resources
  - QUEUE for message
  - Resource timestamps
  - QUERY statistics for MSC Bandwidth
  - DEDB UPDATE DB

OM (Operations Manager)

- ACBLIB Member Online Change
- Sysplex Serial Program Management
- Global Status

RM (Resource Manager)

Common Service Layer (CSL) Overview

- An architecture to improve the systems management capabilities for IMS systems
  - Operations management (Operations Manager)
  - Resource management (Resource Manager)
- Provides
  - A single system image (IMSplex)
  - Ease of use through a single point of control
  - Shared resources across all IMS systems
- Reduces complexity of managing multiple IMS systems

IMSplex Definition

- An IMSplex is a set of IMS address spaces that are working together as a unit and are most likely running in a parallel sysplex (but not required)
- Examples of an IMSplex configuration include:
  - A set of IMS control regions at the V8 and/or V9 level without a CSL that are data sharing or message queue sharing
  - A set of IMS control regions at the V8 and/or V9 level with a CSL that are data sharing and message queue sharing
  - A single IMS control region at the V8 or V9 level with a CSL
- Examples of IMSplex components are:
  - IMS subsystems (DB/DC, DBCTL, DCCTL)
  - CQS
  - CSL components (OM, RM, SCI)
  - A batch or DB utility region using DBRC
  - DBRC batch utility

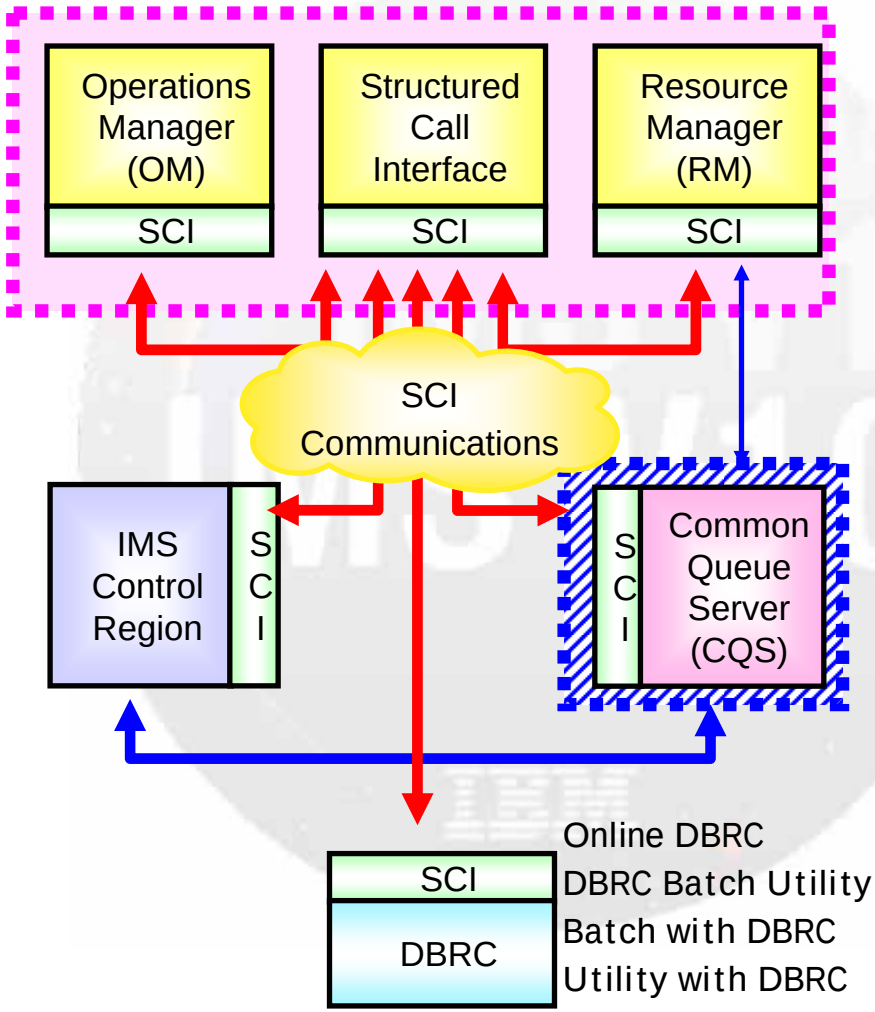
Common Service Layer (CSL) Components

- Operations Manager (OM)
- Resource Manager (RM)
- Structured Call Interface (SCI)

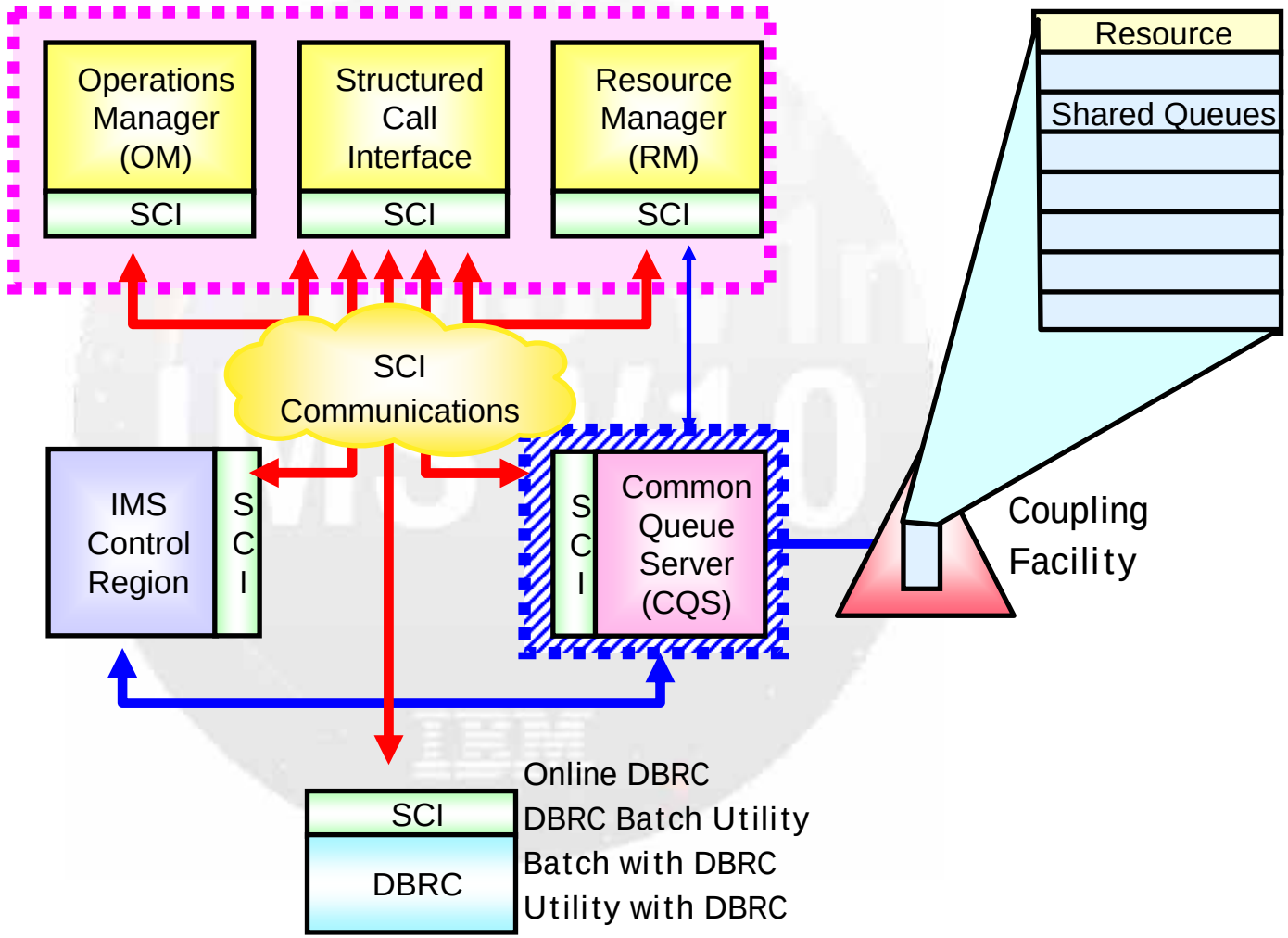
- Based on BPE (Base Primitive Environment)
- Uses CQS (Common Queue Server)

- New address spaces
  - OM, RM, SCI, CQS
- New CF structures (optional)
  - Resource, shared queues

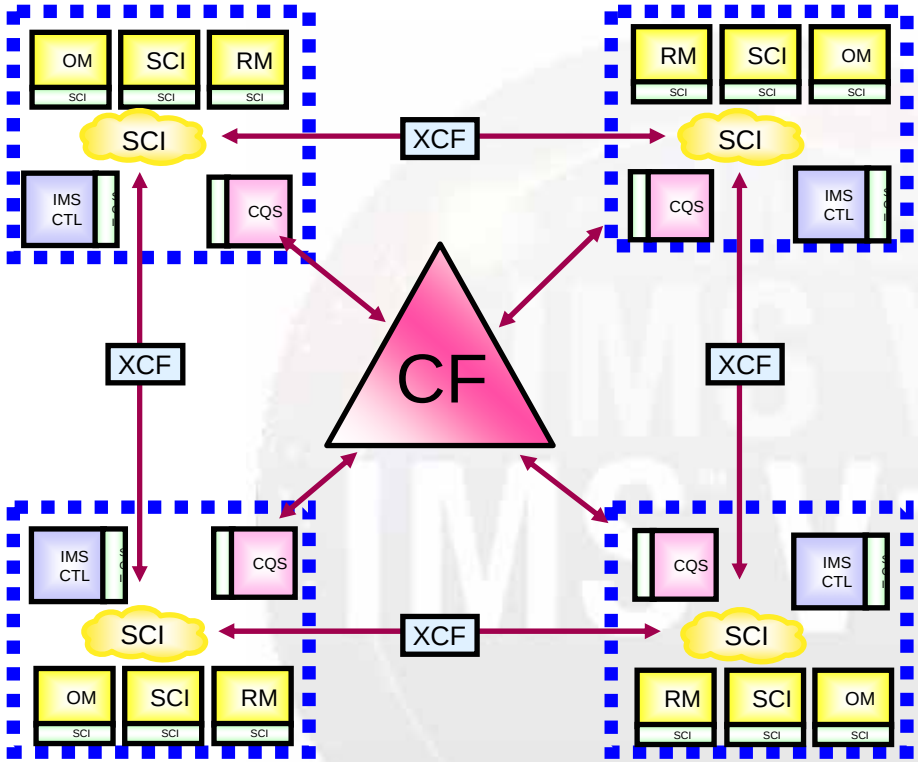
CSL Architecture (Address Spaces)



CSL Architecture (CF Structures)



IMSplex Configuration



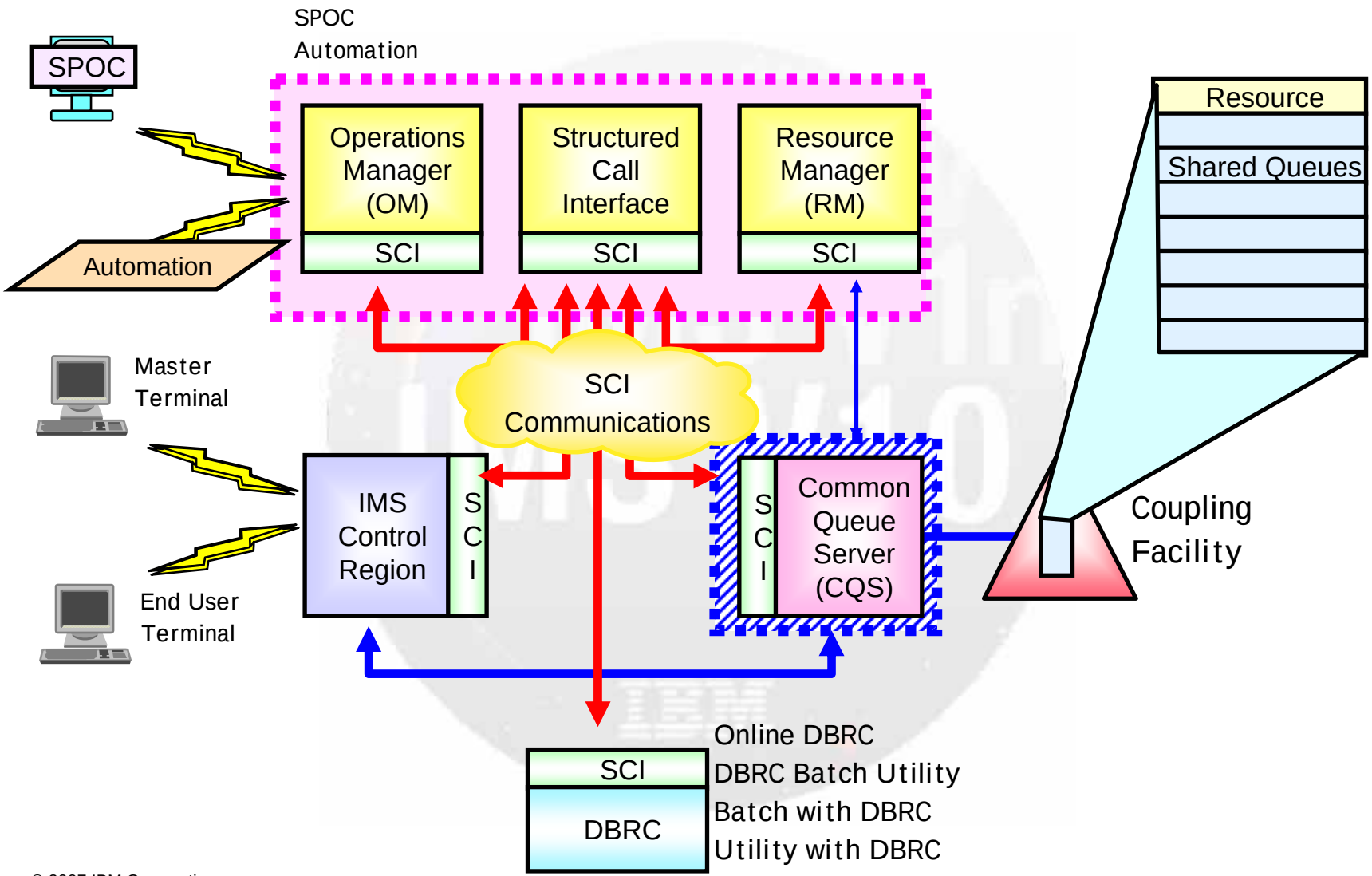
Resource List Structure
LOGR List Structures
Shared Queues List Structures
OSAM Cache Structure
VSAM Cache Structure
Shared VSO Cache Structures
IRLM Lock Structure
VGR List Structure

- In an IMSplex
  - All members share the same CF structures
  - Intra-IMSplex communications is implemented by SCI
    - Uses XCF across z/OS images

Operations Manager (OM) Overview

- Provides ‘single point of control’ for command entry into an IMSplex
  - Focal point for operations management and automation
- Provides the following services
  - Route commands to IMSplex members registered for the command
  - Consolidate command responses from individual IMSplex members into a single response to present to the command originator
  - Support for new IMSplex commands (type-2 commands) and for existing IMS commands (type-1 commands)
  - An API for IMS commands for automation
  - Command security for authorization using RACF or equivalent plus user exit
  - User exit capability for editing command input and responses
- Configuration
  - One of more OM address spaces required per IMSplex

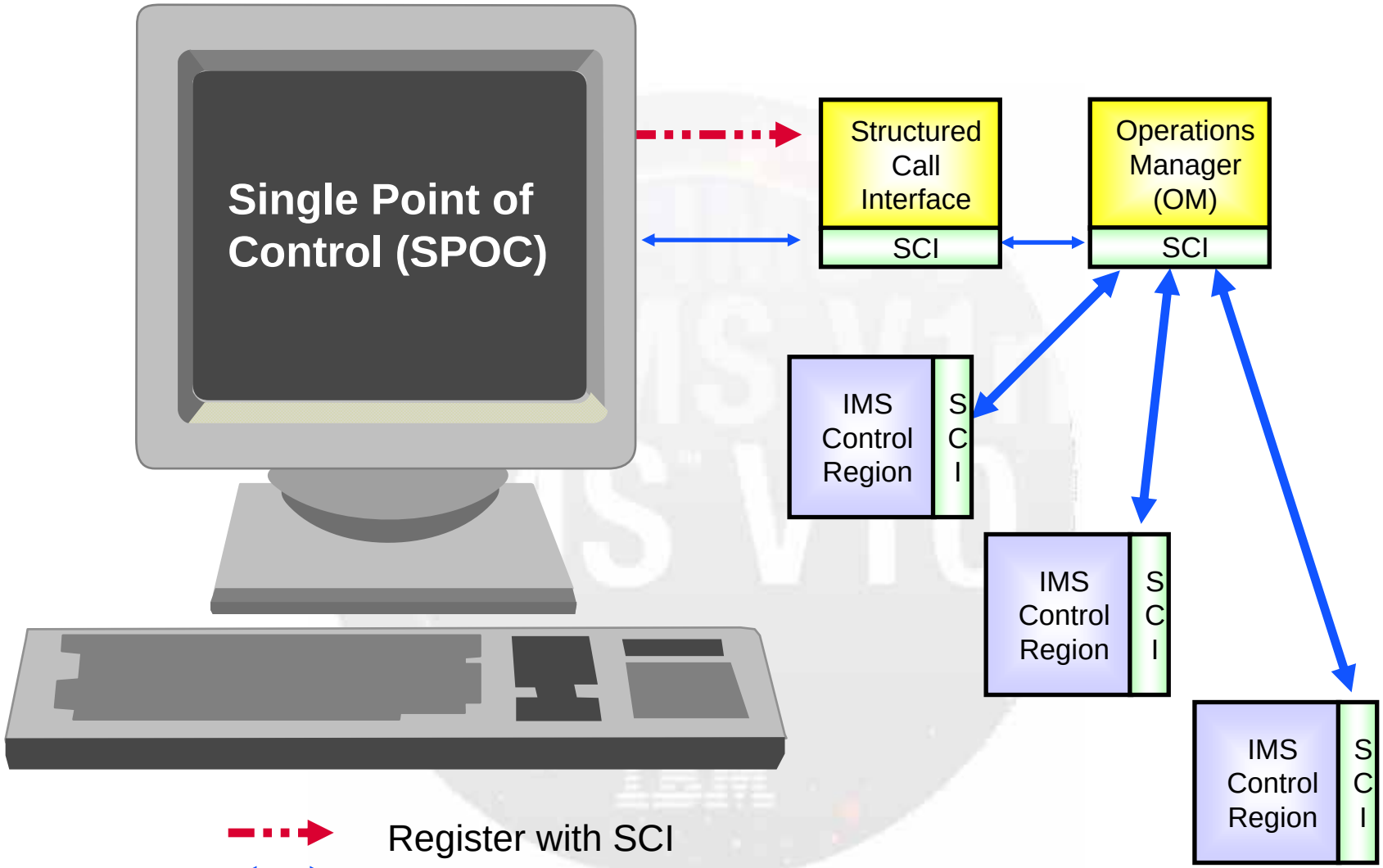
CSL Architecture – Operations Manager (OM)



IMS Single Point of Control (SPOC)

- A SPOC is a program that interfaces between a user and the OM
- From this single point, user can enter commands to any or all IMSs
  - It can run on the mainframe
    - TSO SPOC is provided in IMS
    - REXX SPOC APIs are provided in IMS
  - It can run on the workstation
    - IMS Control Center
- There can be multiple SPOCs in an IMSplex

SPOC Registers with Local SCI



TSO SPOC (Single Point of Control)

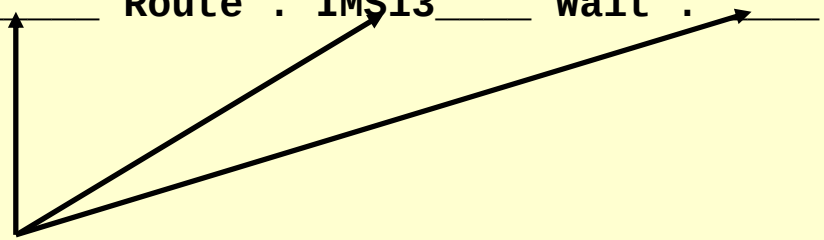
- Runs under z/OS as a TSO/ISPF application
- May or may not be on the same z/OS as OM
  - Must be on a z/OS with an SCI
- Provides a 'green screen' terminal interface from which IMS commands (type-2 or type-1) may be entered by an operator to one or more members of an IMSplex (including DB/DC, DBCTL, DCCTL)
- Formats command responses for display
  - OM response encapsulated in XML
- OM provides security checking
  - TSO userid is used to determine RACF authorization

Type-2 Commands

- INIT (INITiate Process)
- TERM (TERMinate Process)
- UPD (UPDate Resource)
- DEL (DELete Resource)
- QRY (QueRY Resource)
- CRE (CREate Resource) (V10)
- QUE (QUEue Message) (V10)

SPOC Command Entry Panel

```
 File  Display  View  Options  Help  ----------------------------
PLX0                IMS Single Point of Control
Command ===> QRY TRAN NAME(A*) SHOW(ALL)
---------------------- Plex . _____ Route . IMS13____ Wait . ____
Response for:
```



Override 'Preferences'

```
F1=Help F3=Exit F4=Showlog F6=Expand  F9=Retrieve  F12=Cancel
```

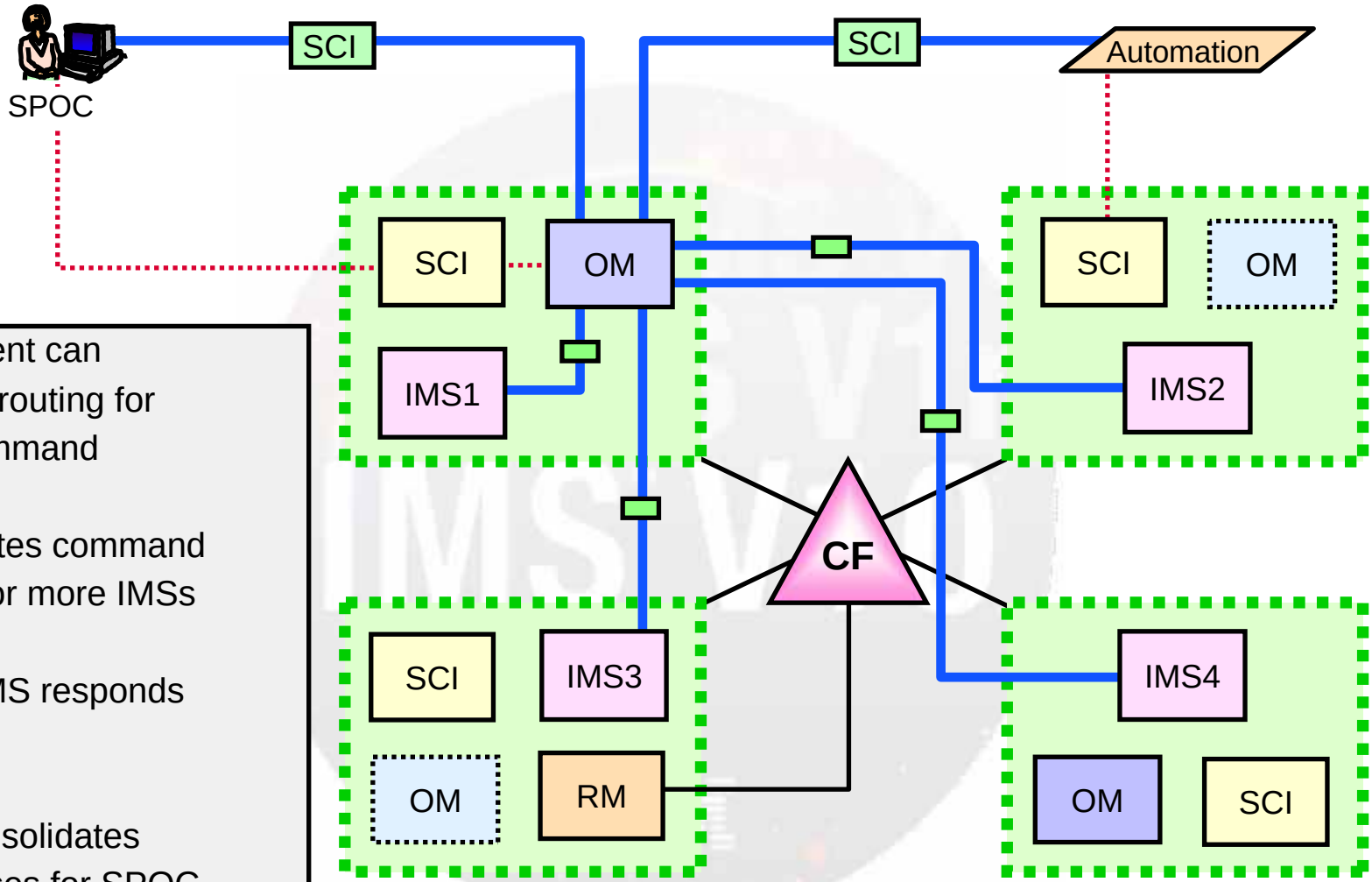
Command Response

```
  File  Display  View  Options  Help  ------------------------------------
                  IMS Single Point of Control
Command ===> ____________________________________________________________
---------------------- Plex . _____ Route . IMS13____ Wait . ____
Response for: QRY TRAN NAME(A*) SHOW(ALL)                  More:   +>
Trancode MbrName    CC PSBname      LCls    LQCnt  LLCT LPLCT
ADDINV   IMS1        0 INVPSB         4        6     2 65535
ADDINV   IMS3        0 INVPSB         4       12     2 65535
ADDPART  IMS1        0 PARTPSB       23        0 65535 65535
etc.
```

Display formatted by SPOC from **XML response**.

```
F1=Help  F3=Exit  F4=Showlog  F6=Expand  F9=Retrieve  F12=Cancel
```

OM in a Multi-IMS IMSplex



OM Client can specify routing for any command

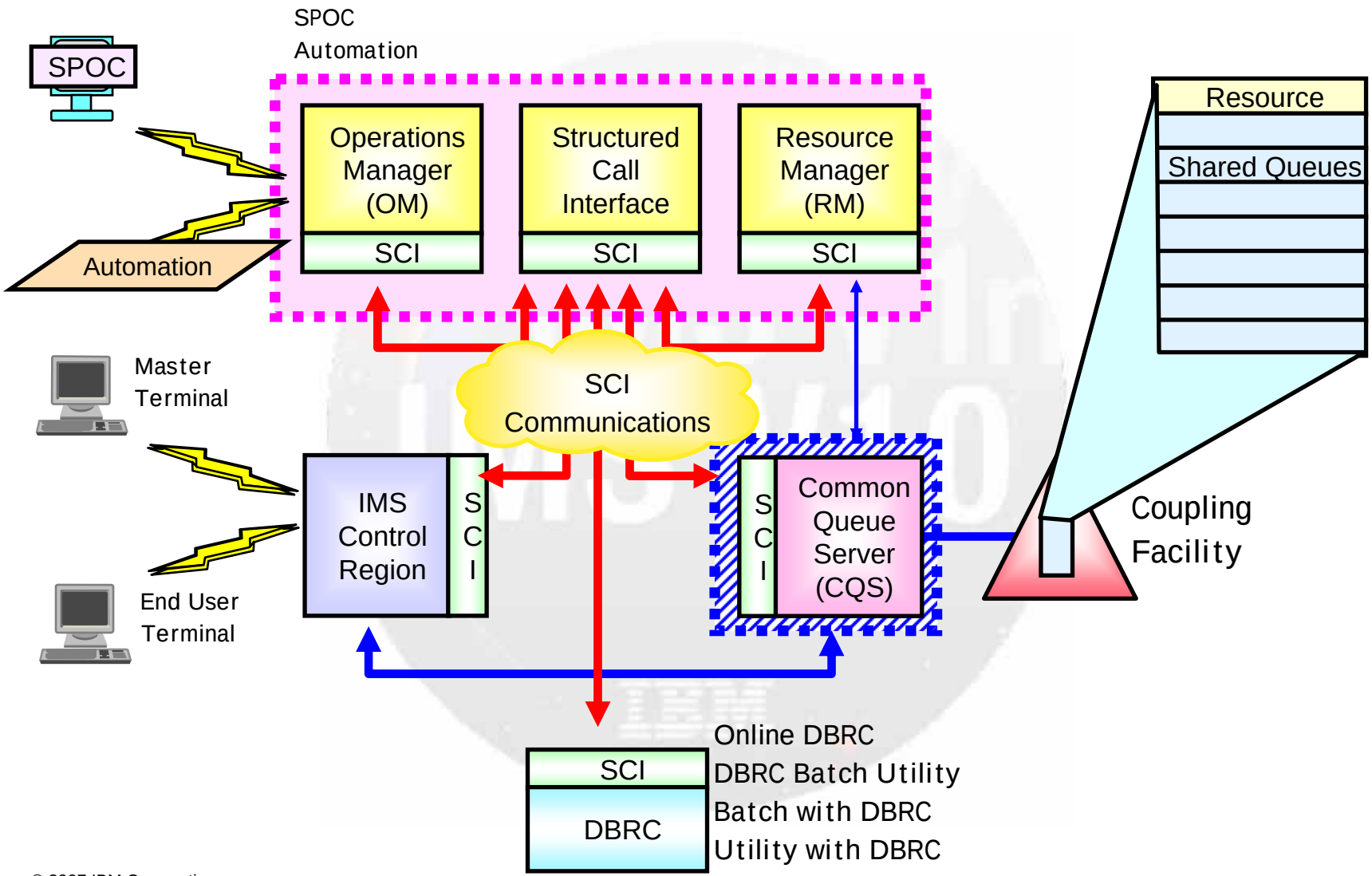
OM routes command to one or more IMSs

Each IMS responds to OM

OM consolidates responses for SPOC

Note: OM does not require a Parallel Sysplex if there is just one z/OS image.

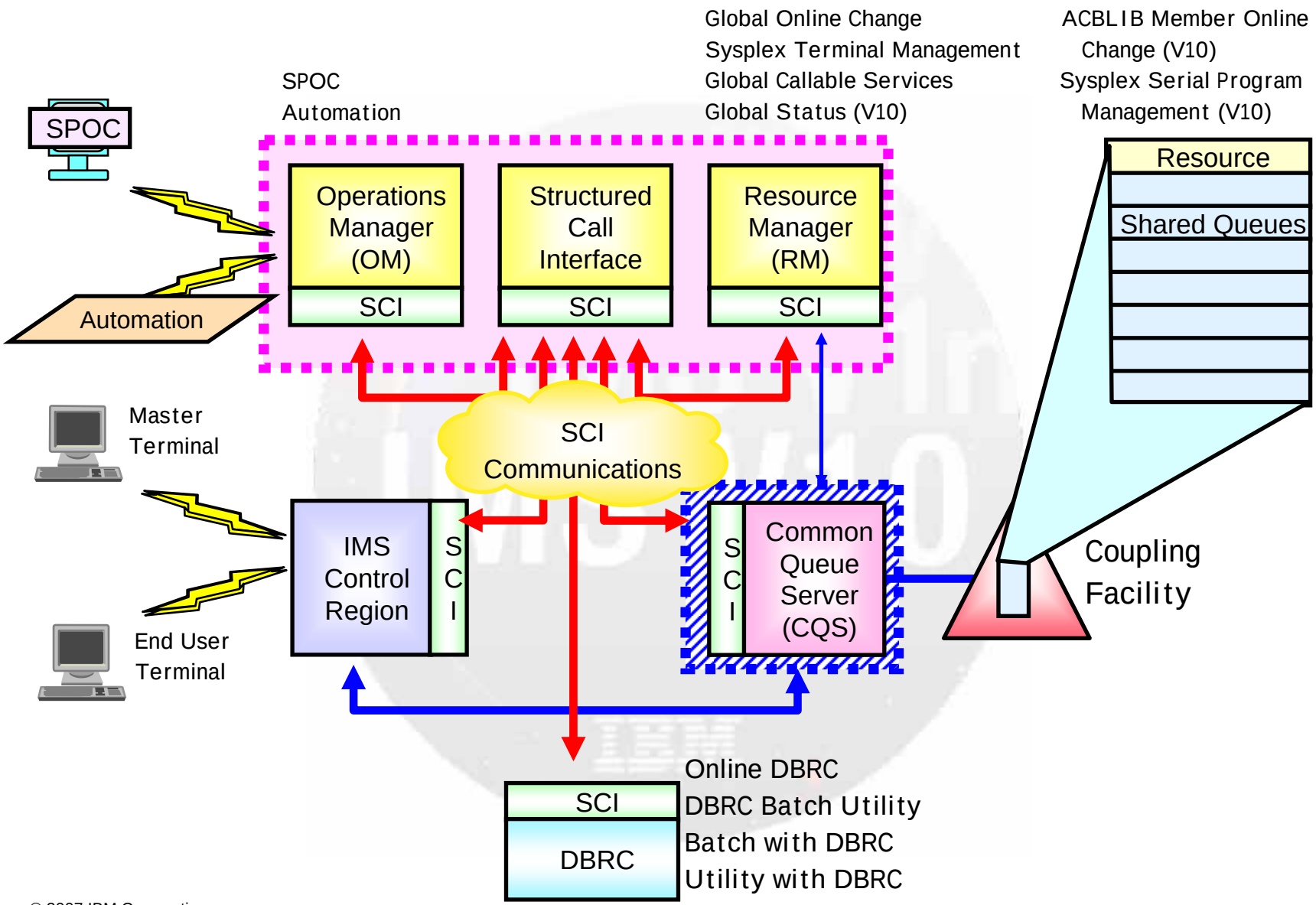
CSL Architecture – Operations Manager (OM)



Resource Manager (RM) Overview

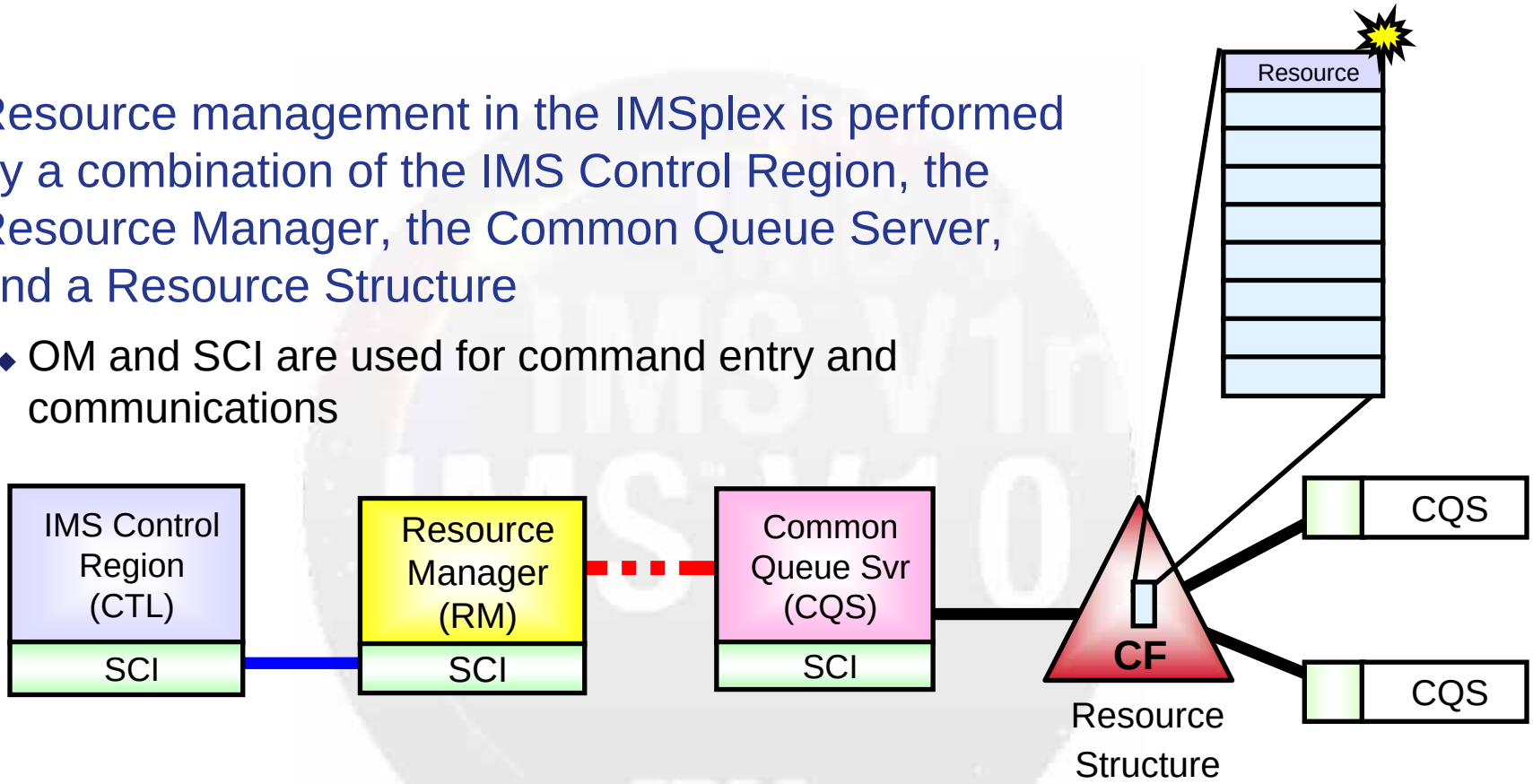
- Provides infrastructure for managing global resources and IMSplex-wide processes
  - IMS is responsible for exploiting RM services
- Provides the following services
  - Maintains global resource information using a resource structure in a Coupling Facility
  - Coordinates IMSplex-wide processes
- Used for the following functions
  - Sysplex Terminal Management (STM) (IMS V8)
  - Global Online Change (GOLC) (IMS V8)
  - Global Callable Services (IMS V8)
  - Global Status (IMS V10)
  - Sysplex Serial Program Management (SSPM) (IMS V10)
  - ACBLIB Member Online Change (IMS V10)

CSL Architecture – Resource Manager (RM)

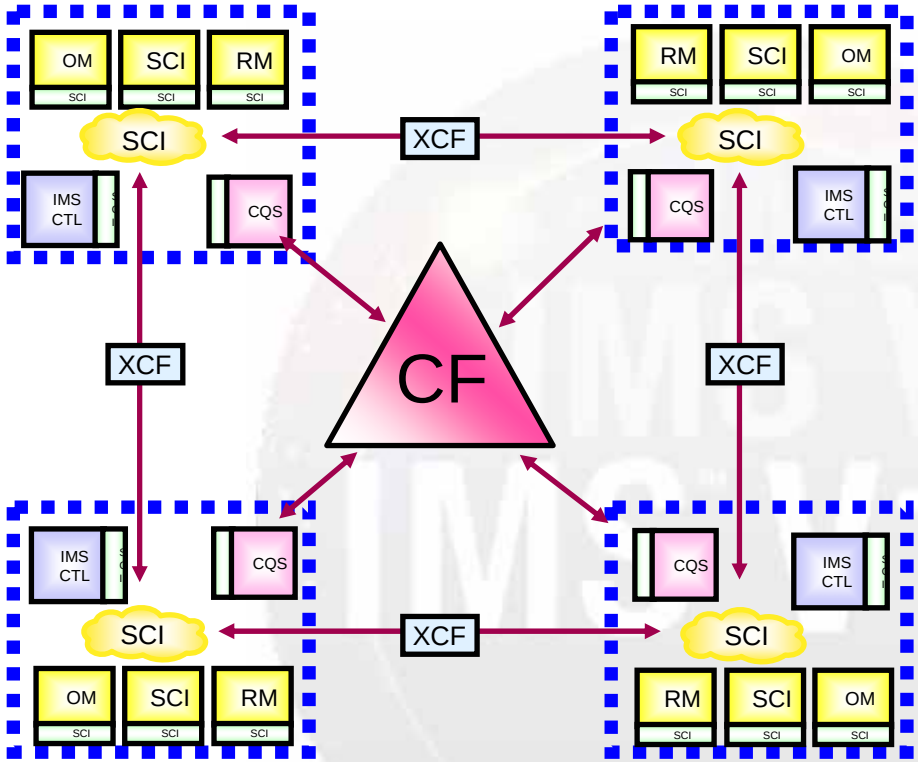


Resource Manager (RM) Configuration

- Resource management in the IMSplex is performed by a combination of the IMS Control Region, the Resource Manager, the Common Queue Server, and a Resource Structure
  - OM and SCI are used for command entry and communications



IMSplex RM Configuration



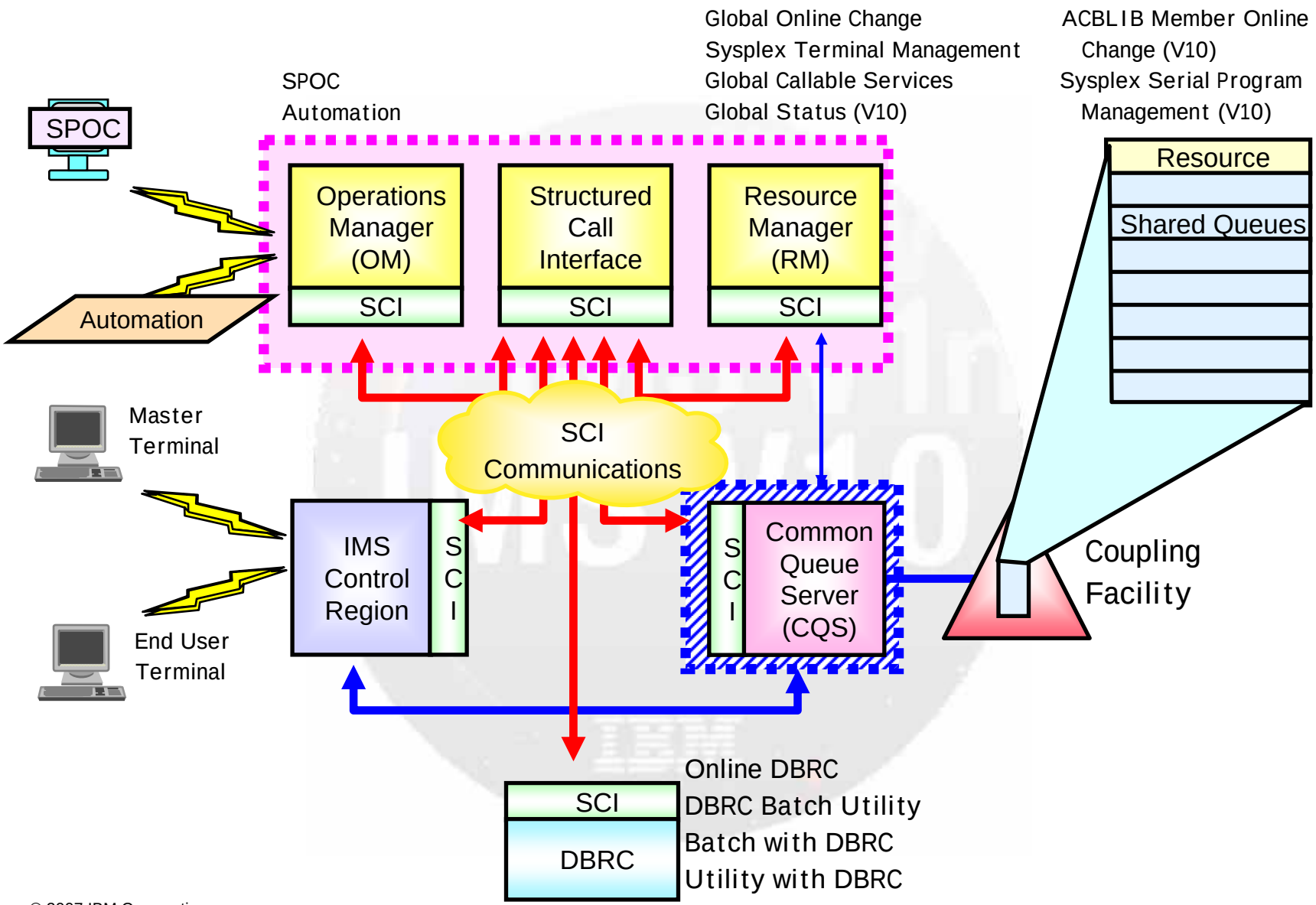
- Resource List Structure
- LOGR List Structures
- SMQ List Structures
- OSAM Cache Structure
- VSAM Cache Structure
- Shared VSO Cache Structures
- IRLM Lock Structure
- VGR List Structure

- One or more RM address spaces required per IMSplex in IMS V8
- Zero or more RM address spaces required per IMSplex in IMS V9/V10
  - Need one or more RM address spaces to enable any RM function

Resource Structure

- Resource structure contains global resource information for uniquely named resources
- Resource structure not required for Global Online Change or ACBLIB Member Online Change (V10)
  - i.e., not required for DBCTL
  - Structure will be used if available
- Resource structure required for other IMSplex-wide global processes and access to global resource information
- One resource structure may be defined per IMSplex

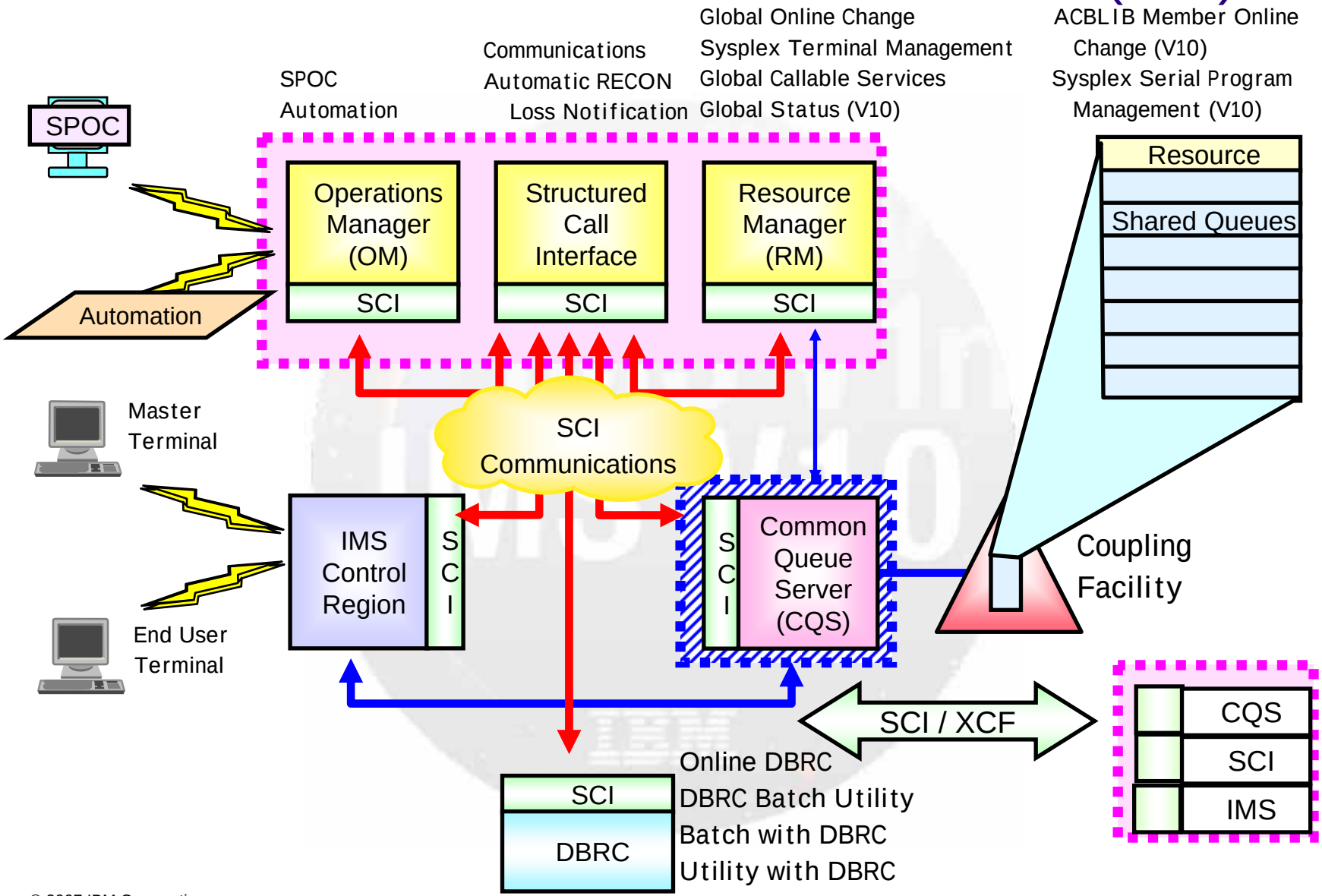
CSL Architecture – Resource Manager (RM)



Structured Call Interface (SCI) Overview

- Provides communications services among IMSplex members in a single z/OS image and across multiple z/OS images in an IMSplex
- Provides the following services
  - Member registration services (security)
    - OM, RM, CQS, IMS, SPOC, IMS Connect, DBRC
  - Communications services
- Used for the following function
  - Automatic RECON Loss Notification (ARLN)
- One SCI address space is required on each z/OS image where CSL is active

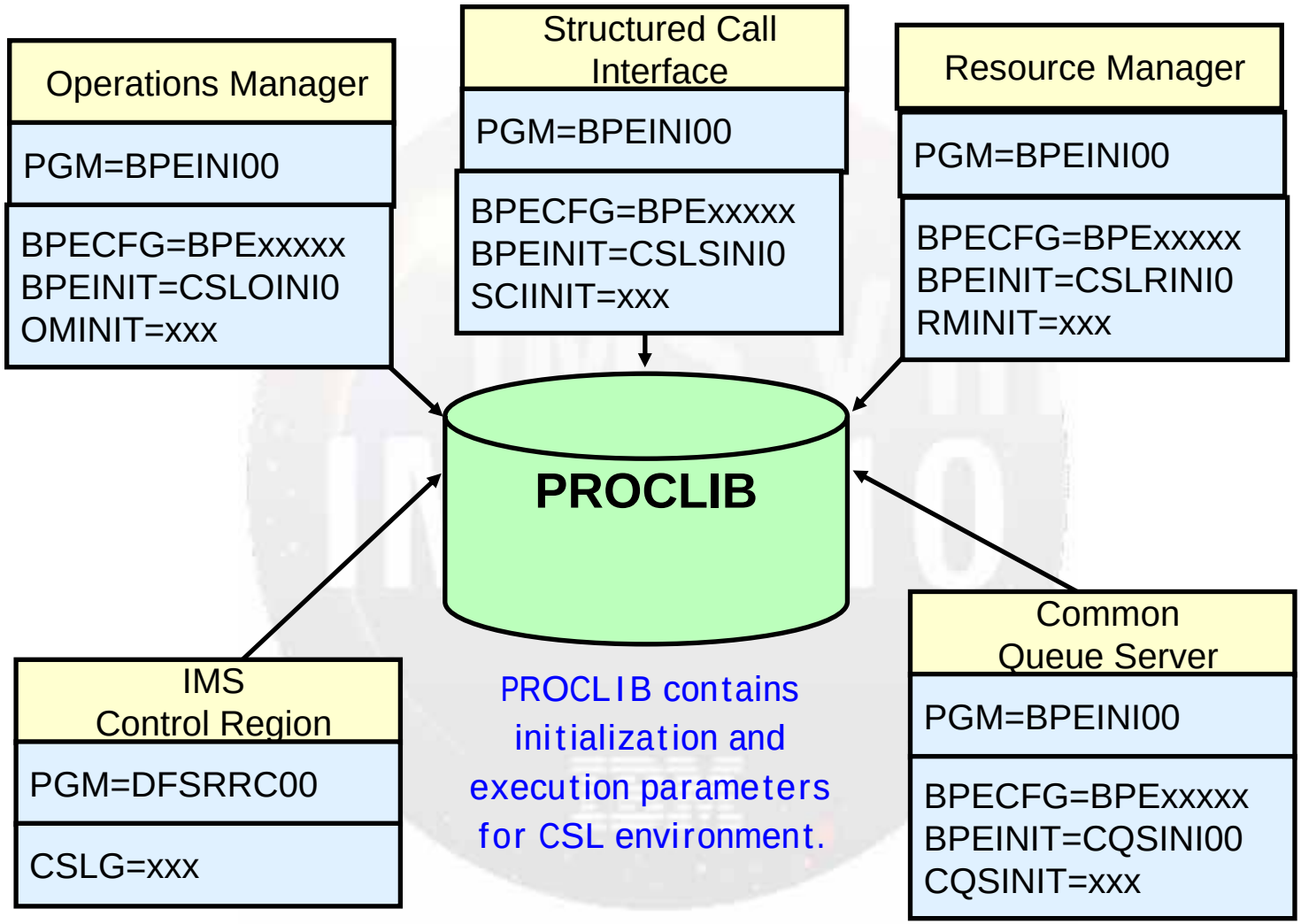
CSL Architecture – Structured Call Interface (SCI)



Setting up the CSL Environment

- BPE setup
- SCI setup
- OM setup
- RM setup
- IMS setup
- z/OS / CF setup

CSL Definition ... High Level View



BPE Setup

- Add BPEINI00 to the z/OS Program Properties Table (PPT)
- Two BPE PROCLIB members
  - Contain trace level and user exit information
  - BPE Configuration Parameters (BPECFG=BPExxxxx)
  - BPE User Exit List
    - EXITMBR= in BPECFG=
      - EXITDEF= in EXITMBR
  - Neither are required
    - Can let BPE configuration parameters default
    - Do not need user exits
  - All IMSplex members can share the BPE PROCLIB members
- All CSL address spaces execute BPEINI00

Some CSL component setup rules

- All IMSplex members can share a PROCLIB
- Each CSL component type (OM, RM, SCI) requires its own
  - Initialization module
  - BPEINIT = CSLxINI0 where x is O/R/S
- Each CSL component address space requires its own
  - Initialization PROCLIB member
  - xxxINIT = yyy
    - where xxx is OM/RM/SCI
    - where yyy is a 3 character suffix used for the CSL initialization PROCLIB member CSLxI yyy
      - where x is O/R/S and yyy is a 3 character suffix

SCI setup

- One SCI address space is required on every z/OS image where CSL is active
- SCI started task JCL found in IMS.PROCLIB (CSLSCI)
- Each SCI address space
  - Executes BPEINI00
  - SCI initialization module
    - BPEINIT=CSLSINI0
  - SCI initialization PROCLIB member CSLSIxxx
    - SCIINIT=xxx
    - Each instance of SCI has a different initialization PROCLIB member to specify its unique SCI name (and IMSplex name)

SCI setup – Sample JCL for 2 SCI instances

```
//SCI1  PROC      RGN=0,SOUT=A, RESLIB='IMS.SDFSRESL',
//                  BPECFG=BPEPLX0,                    <<< BPE configuration parms
//                  SCIINIT=001,                       <<< default CSLSIxxx member
//                  PARM1=                             << PROCLIB member overrides
//SCIPROC  EXEC   PGM=BPEINI00,REGION=&RGN,
//                  PARM='BPECFG=&BPECFG,
//                  BPEINIT=CSLSINI0,                  <<< initialize for SCI
//                  SCIINIT=&SCIINIT,&PARM1'           <<< SCI PROCLIB member
//STEPLIB         DD      DSN=&RESLIB,DISP=SHR
//    ..

//SCI2  PROC      RGN=0,SOUT=A,RESLIB='IMS.SDFSRESL',
//                  BPECFG=BPEPLX0,                    <<< BPE configuration parms
//                  SCIINIT=002,                       <<< default CSLSIxxx member
//                  PARM1=                             <<< PROCLIB member overrides
//SCIPROC  EXEC   PGM=BPEINI00,REGION=&RGN,
//                  PARM='BPECFG=&BPECFG,
//                  BPEINIT=CSLSINI0,                  <<< initialize for SCI
//                  SCIINIT=&SCIINIT,&PARM1'           <<< SCI PROCLIB member
//STEPLIB         DD      DSN=&RESLIB,DISP=SHR
//    ..
```

SCI setup – CSLSI001 example

ARMRST=Y|N	**<<<**	**ARM restart enabled?**
SCINAME=SCI1	**<<<**	**SCI Name (SCIid = SCI1SC)** **Name must be unique within IMSplex;** **shows up on messages from this component.**
IMSPLEX=(NAME=PLX0)	**<<<**	**IMSplex name = CSLPLX0.** **IMSplex XCF group name.** **Name must be same for all CSL address spaces, CQS, and IMS.**
FORCE=(ALL,[SHUTDOWN])	**<<<**	**Cleanup ECSA [and shutdown]**

OM Setup

- An OM address space is required on at least one z/OS image where CSL is active
  - Recommend a second OM for backup
- OM started task JCL found in IMS.PROCLIB (CSLOM)
- Each OM address space
  - Executes BPEINI00
  - OM initialization module
    - BPEINIT=CSLOINI0
  - OM initialization PROCLIB member CSLOIxxx
    - OMINIT=xxx
    - Each instance of OM has a different initialization PROCLIB member to specify its unique OM name (and IMSplex name)

OM setup – Sample JCL for OM instance

```
//OM1  PROC      RGN=0,SOUT=A, RESLIB='IMS.SDFSRESL',
//                 BPECFG=BPEPLX0,                    <<< BPE configuration parms
//                 OMINIT=001,                        <<< default CSLOIxxx member
//                 PARM1=                             << PROCLIB member overrides
//OMPROC  EXEC   PGM=BPEINI00,REGION=&RGN,
//                 PARM='BPECFG=&BPECFG,
//                 BPEINIT=CSLOINI0,                  <<< initialize for OM
//                 OMINIT=&OMINIT,&PARM1'             <<< OM PROCLIB member
//STEPLIB        DD                DSN=&RESLIB,DISP=SHR
//   ..
```

OM setup – CSLOI001 example

```
ARMRST=Y|N                  <<< ARM restart enabled?
OMNAME=OM1                  <<< OM Name (OMid = OM1OM)
IMSPLEX=(NAME=PLX0)         <<< IMSplex name = CSLPLX0
CMDSEC=N|E|R|A              <<< Command Security Level
                                None, Exit, RACF, All
CMDLANG=ENU                 <<< US English
CMDTEXTDSN=IMS.TRANABLE     <<< Command syntax translation table
```

RM Setup

- At least one RM address space is required in an IMSplex to use RM functions (V9)
  - Recommend a second RM for backup
  - If you do not require RM functions, you can configure without an RM by specifying RMENV=N in your DFSCGxxx PROCLIB member
- One RM address space is required in V8 with CSL
- A resource structure is optional in an IMSplex
  - If no resource structure is defined, you can have only one RM address space
  - If a resource structure is defined, you can have one or more RM address spaces
- RM started task JCL found in IMS.PROCLIB (CSLRM)
- Each RM address space
  - Executes BPEINI00
  - RM initialization module
    - BPEINIT=CSLRINI0
  - OM initialization PROCLIB member CSLRIxxx
    - RMINIT=xxx
    - Each instance of RM has a different initialization PROCLIB member to specify its unique RM name (and IMSplex name)

RM setup – Sample JCL for RM instance

```
//RM1  PROC      RGN=0,SOUT=A, RESLIB='IMS.SDFSRESL',
//                 BPECFG=BPEPLX0,          <<< BPE configuration parms
//                 RMINIT=001,              <<< default CSLRIxxx member
//                 PARM1=                   <<< PROCLIB member overrides
//RMPROC  EXEC   PGM=BPEINI00,REGION=&RGN,
//                 PARM='BPECFG=&BPECFG,
//                 BPEINIT=CSLRINI0,        <<< initialize for RM
//                 RMINIT=&RMINIT,&PARM1'   <<< RM PROCLIB member
//STEPLIB        DD       DSN=&RESLIB,DISP=SHR
//   ..
```

RM setup – CSLRI001 example

```
ARMRST=Y|N                  <<< ARM restart enabled?

RMNAME=RM1                  <<< RM Name (RMid = RM1RM)

CQSSSN=CQS1                 <<< CQS NAME

IMSPLEX=(
      NAME=PLX0,            <<< IMSplex Name = CSLPLX0
      RSRCSTRUCTURE(        <<< Resource Structure
      STRNAME=RSRCSTR1))    <<<   Name
```

CQS Setup

- A CQS address space is required on every z/OS image where RM exists and a Resource Structure is being used
  - CQS for RM not required if no RM resource structure
- RM uses CQS services to manage the resource structure
- CQS started task JCL found in IMS.PROCLIB (CQS)
- Each CQS address space
  - Executes BPEINI00 (or optionally CQSINIT0)
  - CQS initialization module
    - BPEINIT=CQSINI0
  - CQS initialization PROCLIB member CQSIPxxx
    - CQSINIT=xxx
    - Each instance of CQS has a different initialization PROCLIB member

CQS setup – Sample JCL for CQS instance

```
//CQS1  PROC      RGN=0,SOUT=A, RESLIB='IMS.SDFSRESL',
//                  BPERES='IMS.SBPERESL',
//                  BPECFG=BPEPLX0,                    <<< BPE configuration parms
//                  CQSINIT=001,                       <<< default CQSIPxxx member
//                  PARM1=                             <<< PROCLIB member overrides
//RMPROC EXEC     PGM=BPEINI00,REGION=&RGN,
//                  PARM='BPECFG=&BPECFG,
//                  BPEINIT=CQSINI00,                  <<< initialize for CQS
//                  CQSINIT=&CQSINIT,&PARM1'           <<< CQS PROCLIB member
//STEPLIB         DD        DSN=&RESLIB,DISP=SHR
//   ..
```

CQS Setup …

- CQS has 3 PROCLIB members
  - CQSIPxxx (unique)
    - Identified by CQSINIT parameter on CQS procedure

```
CQSGROUP=SQGP0,
STRDEFG=000,
STRDEFL=001,
IMSPLEX=(NAME=PLX0)
```

  - CQSSGxxx (common to all CQSs)
    - Identifies name of Resource Structure

```
RSRCSTRUCTURE(STRNAME=RSRCSTR0)
```

  - CQSSLxxx (unique)
    - Not applicable to resource structure
    - Not required if this CQS not managing shared queue structures

IMS Setup

- Changes in control region JCL only if using Global Online Change
  - Remove local //MODSTAT DD statement
  - Add //OLCSTAT DD statement and data set
- One new PROCLIB member
  - DFSCGxxx
- One new execution or DFSPBxxx parameter
  - Identifies DFSCGxxx
  - CSLG=xxx
- Two new DFSVSMxx parameters
  - OCMD and CSLT
- Several new DFSDCxxx parameters
  - SRMDEF and RCVYxxxx

z/OS / CF Setup

- CFRM (if using resource structure)
  - Update CFRM Couple Data Set
    - System managed duplexing, system managed rebuild
  - Define the RM resource structure in the CFRM Policy

STRUCTURE NAME(RSRCSTR0)
INITSIZE(4096)
SIZE(8192)
MINSIZE(2048)
ALLOWAUTOALT(NO|YES)
DUPLEX(DISABLED|ALLOWED|ENABLED)
PREFLIST(CF01,CF02)

  - Activate policy in sysplex

Starting the CSL Environment

- The sequence in which members are started is important
  - Start SCI first
    - All IMSplex members register with SCI
  - Start (at least one) OM
    - RM and IMS register with OM
    - SPOC registers with OM
  - Start CQS everywhere there is an RM and structure
    - RM registers with CQS
  - Start (at least one) RM
    - Start only one RM if no resource structure
    - IMS registers with RM
  - Start IMS
    - Nobody registers with IMS
  - Start SPOC
    - Anytime after OM started

Starting the CSL Environment …

- Start SCI first
  - SCI is required by every member of the IMSplex

S SCI1

CSL0020I SCI READY SCI1SC

- Start OM second

S OM1

CSL0020I OM READY OM1OM

- Start CQS if using a resource structure
  - May be started by IMS if using shared queues
  - Must be started by user if only for RM

S CQS1

CSL0020I CQS READY CQS1CQS

  - After Structure is defined and activated
    - CQS connects to structure
  - After SCI is started
    - CQS registers with SCI
  - Before RM is started
    - RM registers with CQS

Starting the CSL Environment …

- Start RM after SCI, OM, CQS

  S RM1

  CSL0020I RM READY RM1RM

- Start IMS after SCI, OM, and RM
  - IMS registers with all 3

  S IMS1

- Start SPOC anytime after OM started

Shutting down the CSL Environment

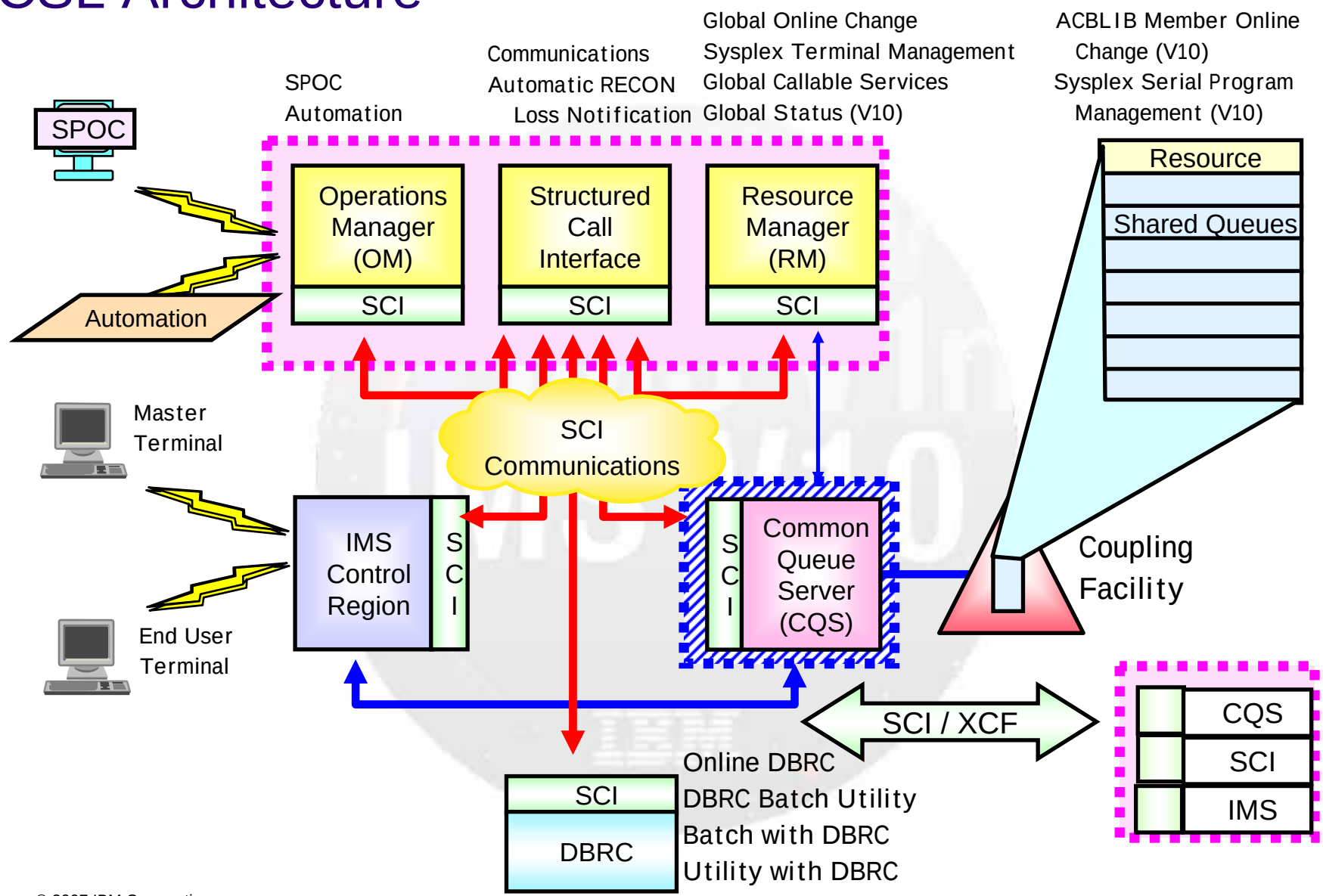
- Shutdown CSL after shutdown of IMS control region
  - CSL can stay up if restarting IMS control region soon
- Recommend shutting down CSL as a whole unit
  - To shutdown an entire IMSplex
    - Issue the CSL SHUTDOWN CSLPLEX command with the z/OS MODIFY command interface to any SCI in the IMSplex
      - f scijobname,SHUTDOWN CSLPLEX
  - To shutdown CSL on one z/OS image
    - Issue the CSL SHUTDOWN CSLLCL command with the z/OS MODIFY command interface to the SCI on that z/OS image
      - f scijobname, SHUTDOWN CSLLCL
- You can stop individual components in the IMSplex by issuing the z/OS STOP (P) command to the address space you want to stop

Common Service (CSL) Summary

- Common Service Layer is part of the evolving IMSplex architecture
  - Required to take advantage of many new IMS V10 functions
- Improvements for Operations Management
- Improvements for Resource Management

- Begin implementing CSL now in IMS V9 or IMS V8 so you can be positioned for exploiting new IMS V10 functions

CSL Architecture



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