

# **SAP® R/3® 4.6C**

## **Large Banking Application on IBM® eServer™ zSeries® Using PPRC**



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## Introduction

Peer-to-Peer Remote Copy (PPRC) is a remote data mirroring technique. It is used in business solutions to help protect against disk storage subsystem loss or site failures. PPRC is a hardware based solution of the IBM® TotalStorage® Enterprise Storage Server® (ESS) that can be used in many IBM operating environments. PPRC is not only a valuable tool for data recovery, but for migration of data and application workloads.

The purpose of this document is to provide the audience with the experience and procedures used by the SAP IBM Performance Benchmark Team in Poughkeepsie, New York to perform a PPRC migration from an ESS F20 to an ESS 800 for a 1 terabyte DB2V7 SAP database. In our environment, it was necessary to move data from one ESS unit of 288 3390-9's to another. PPRC was chosen so to help reduce the amount of effort required. This information should be used as an aid for system setup and planning a PPRC move.

Our application is an SAP® R/3® 4.6C banking application with five million accounts, using 144 3390-9s. In addition, there is a “flashcopy” copy of the database. The database is primarily used to simulate account balancing processes (typical of a bank’s night batch) workload that concentrates on sequential record processing.

## Overview of Environment

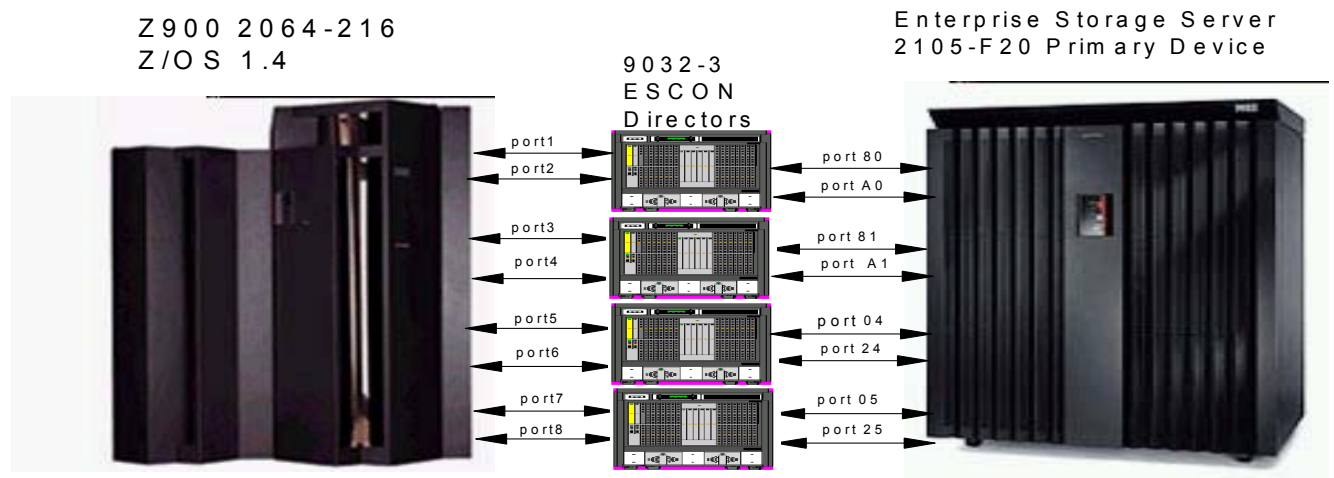
The IBM eServer™ zSeries® z900 2064-216 processor system which ran the PPRC jobs was IPL'ed on a z/OS® 1.4 driver with the PPRC service installed.

- The PPRC commands were defined RACF.
- Both ESS's (primary and secondary) had the PPRC feature installed and enabled.

Primary ESS: SAP22 (2105 13049) is a model F20 with 40 8-packs of 18GB DDMs. It has 8 LCUs, each of which contains 5 arrays with 16 Escon® ports. Eight Escon® ports were connected to the primary MVS system, the remaining 8 Escon® ports were used for PPRC connectivity.

Secondary ESS: SAP24 (2105 25471) is a model 800 with 16 8-packs of 36GB DDMs. It has 8 LCUs, each of which contains 2 arrays with 8 Escon® ports and 8 Ficon™ ports. The 8 Escon ports were used for PPRC connectivity.

### SAP Environment Before PPRC



Note: the 2064 was connected to primary ESS using 4 9032 ESCON directors and all 16 ESCON ports on the ESS. Ports 00, 01, 20, 21, 84, 85, A4, A5, were used for PPRC.

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### Methodology

To help produce a successful migration of data, the current DASD needed to be mapped to the new ESS 800. Array and loop information that was used for DASD placement on the primary ESS F20 was preserved on the ESS 800. For example, if a device was on array 1 loop B, then on the ESS 800 it was placed on a device that was on array 1 loop B. For future reference, the ESS F20 will be referred to as SAP22 and the ESS 800 as SAP24. There was no need for an IODF update during the PPRC process due to the ESS to ESS connection.

Below is a sample of how the existing volumes from SAP22 were mapped to SAP24. This upfront planning is important later on for establishing pairs and paths between the units.

DevNum (SAP22)	Volid (SAP22)	SSID (SAP24)	CCA	Array/Loop
5000	ESS000	4E00	00	A/1
5001	ESS001	4E00	01	A/1
5002	ESS002	4E00	02	A/1
502A	ESS02A	4E00	14	B/1
....				
5100	ESS100	4E01	00	A/1
513F	ESS13F	4E01	25	B/1
...for all 288 volumes				

The chart below is the SSID/CCA mapping of loops and arrays for SAP24.

LSS SSID	CCA	Loop	Array
4E00	00-13	A	1
4E02	14-27	B	1
4E04	28-2B	A	1
4E06	2C-2F	B	1
4E01	00-13	A	1
4E03	14-27	B	1
4E05	28-2B	A	1
4E07	2C-2F	B	1

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## Cabling and Connectivity

The only system that should have access to this ESS during the data migration is the primary system from which PPRC will be run. The ESS F20 devices and configured chpids were varied off-line from all of the other systems, so the primary system would be the only system to access the primary ESS F20 devices. The ports were blocked on the switches for the other systems so no messages would be displayed when the cables were disconnected. The 8 "PPRC" Escon cables were connected from the primary ESS F20 unit to the ESS 800 unit.

## Establish Paths and Pairs for PPRC

PPRC relies on established link paths and volume pairs between units. Multiple parameters are required to make these relationships happen. Paths are established first, then the pairs. To establish the link paths, the following commands were issued per LSS. A link address needs to be created. The link address was made up of the SAID (System Adapter ID), 00 for direct connection, and the LSS. For this effort, 8 link addresses were established due to the large quantity of data being moved. The SAIDs were hard to determine. It turns out these values depend upon the F20. The PPRC ports on the ESS F20 make up the SAID. In this case, the ports were 0000, 0001, 0020, 0021, 0084, 0085, 00A4, and 00A5. The rest of the parameters were straightforward (serial number, SSID, LSS, device number).

*Establish link paths*      Link address (aaaabbcc)  
AAAA ==> SAID  
BB      ==> 00 direct connection  
CC      ==> LSS (00-07)

```
CESTPATH DEVN(devn) +  
  PRIM(devn s/n LSS) SEC(devn s/n LSS) +  
  LINK(aaaabbcc)
```

```
CESTPATH DEVN(X'5000') +  
  PRIM(X'5E00' 13049 X'00') SEC(X'4E00' 25741 X'00') +  
  LINK(X'00000000' X'00010000' X'00200000' X'00210000' +  
    X'00840000' X'00850000' X'00A40000' X'00A50000')
```

```
CESTPATH DEVN(X'5100') +  
  PRIM(X'5E01' 13049 X'01') SEC(X'4E01' 25741 X'01') +  
  LINK(X'00000001' X'00010001' X'00200001' X'00210001' +  
    X'00840001' X'00850001' X'00A40001' X'00A50001')
```

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### Establish Pairs

Using the planning charts simplified the task of establishing pairs. The following commands were used to establish the pairs. 288 commands were issued, one for each volume pair.

```
CESTPAIR DEVN(devn) +  
    PRIM(devn s/n cca LSS) SEC(devn s/n cca LSS) +  
    MODE(COPY) ONLINSEC(YES)
```

```
CESTPAIR DEVN(X'5000') PRIM(X'5E00' 000000013049 X'00' X'00') +  
    SEC(X'4E00' 000000025741 X'00' X'00') +  
    MODE(COPY) ONLINSEC(YES)
```

```
CESTPAIR DEVN(X'5001') PRIM(X'5E00' 000000013049 X'01' X'00') +  
    SEC(X'4E00' 000000025741 X'01' X'00') +  
    MODE(COPY) ONLINSEC(YES)
```

```
CESTPAIR DEVN(X'5018') PRIM(X'5E00' 000000013049 X'18' X'00') +  
    SEC(X'4E00' 000000025741 X'02' X'00') +  
    MODE(COPY) ONLINSEC(YES)
```

### Check Status

There are many query commands for this exercise with 288 volumes. It was easier to use the unformatted command and scan for "PENDING" or "DUPLEX" or "," to determine whether a copy was complete or not. To query the devices to see if the device is copied or not, the following command was used:

```
CQUERY DEVN(X'5000') UNFORMAT
```

### Before PPRC is complete

```
ANTP0091I CQUERY UNFORMAT LVL 2 875  
VOLUME REPORT  
5000,PRIMARY,PENDING,ACTIVE,  
5E0000,00,000000013049,4E0000,00,000000025741,N,N,  
8,00000000,01,00010000,01,00200000,01,00210000,01,  
00840000,01,00850000,01,00A40000,01,00A50000,01,  
0120129,0150255,000
```

Percent complete is 0; this is validated by the last three numbers 000.

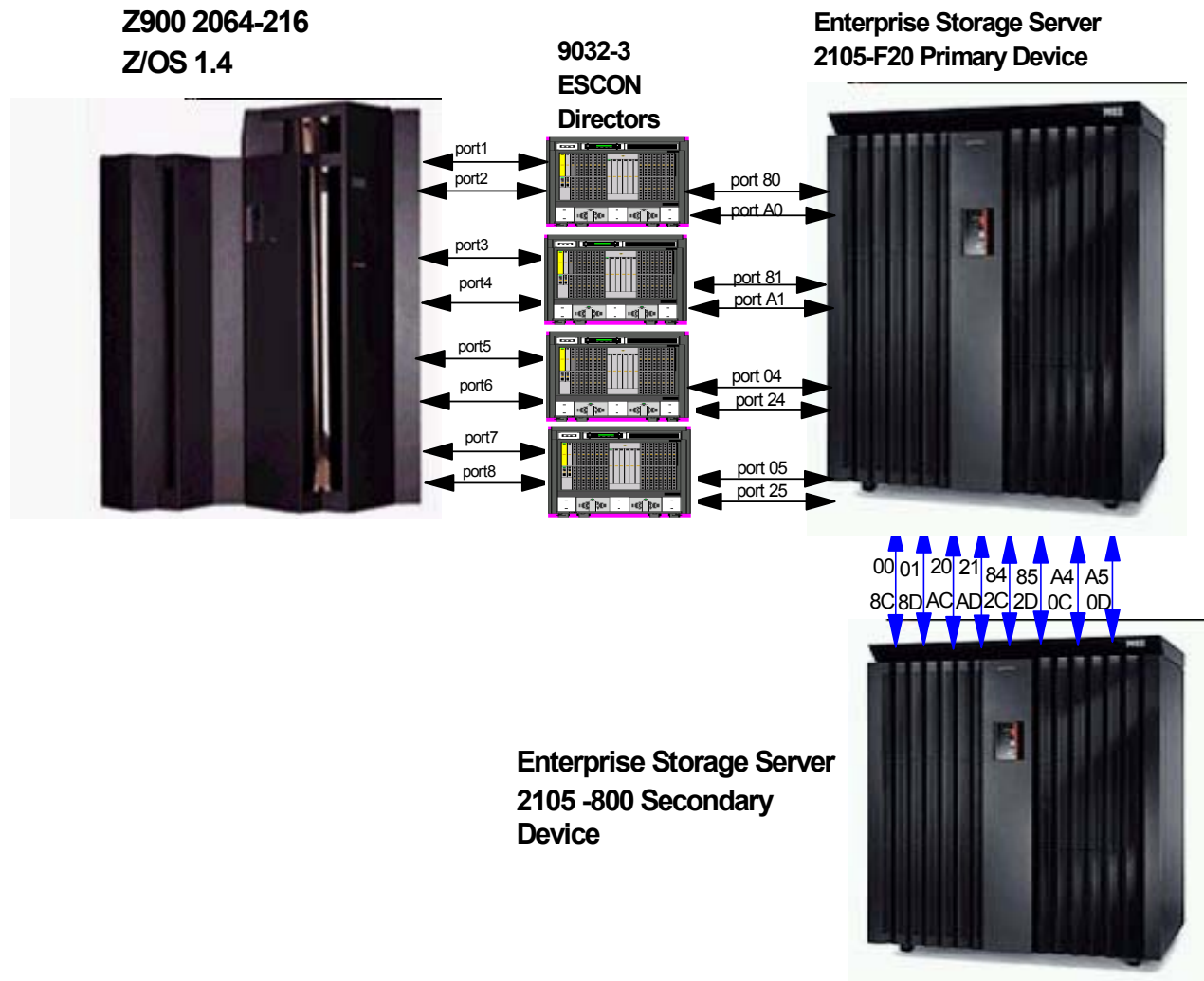
# SAP R/3 4.6C Large Banking Application on zSeries Using PPRC

## During PPRC copy

```
ANTP0091I CQUERY UNFORMAT LVL 2 901
VOLUME REPORT
5000,PRIMARY,PENDING,ACTIVE,
5E0000,00,000000013049,4E0000,00,000000025741,N,N,
8,00000000,01,00010000,01,00200000,01,00210000,01,
00840000,01,00850000,01,00A40000,01,00A50000,01,
0099758,0150255,034
```

Percent complete is 34%; this is validated by the last three numbers of 034.

## SAP Environment During PPRC



# SAP R/3 4.6C Large Banking Application on zSeries Using PPRC

## After PPRC is complete

```
ANTP0091I CQUERY UNFORMAT LVL 2 992
VOLUME REPORT
5000,PRIMARY,DUPLEX,ACTIVE,
5E0000,00,000000013049,4E0000,00,000000025741,N,N,
8,00000000,01,00010000,01,00200000,01,00210000,01,
00840000,01,00850000,01,00A40000,01,00A50000,01,
'''
Percent complete is 100%, validated by the “,,,” and DUPLEX,ACTIVE.
```

## Break Pairs and Paths

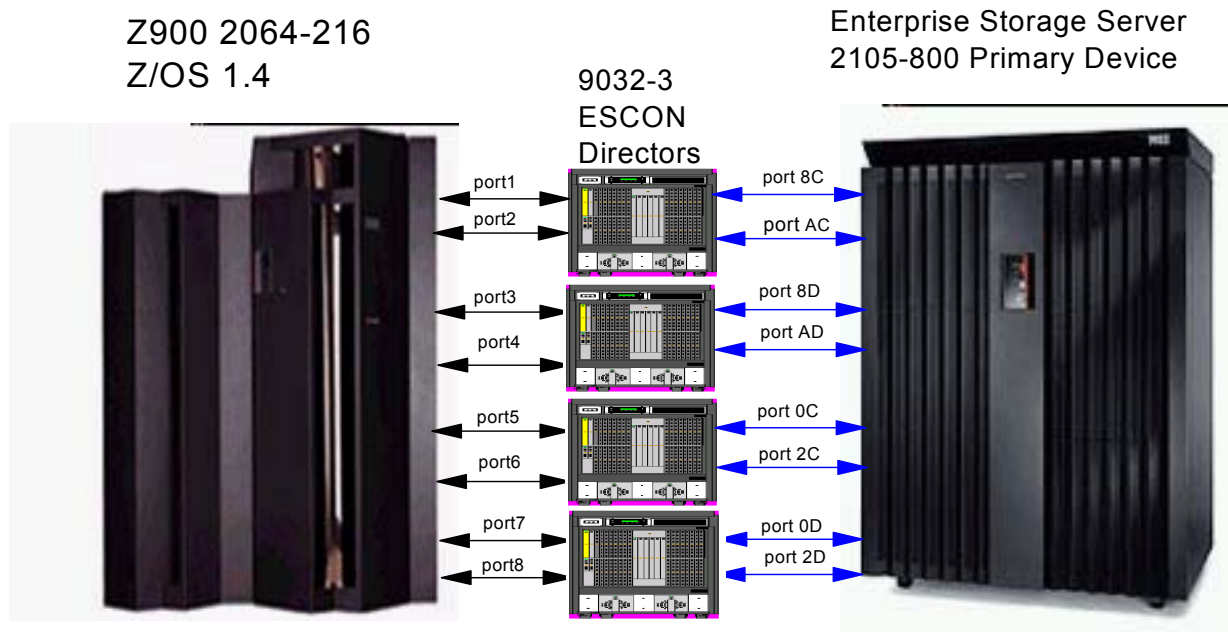
In this case, the PPRC was used for moving large amounts of data. It was not being used for recovery and backup. Therefore, the pairs and paths needed to be terminated. The following commands were invoked:

```
CDELPAIR DEVN(X'5000') PRIM(X'5E00' 000000013049 X'00' X'00') +
SEC(X'4E00' 000000025741 X'00' X'00')
```

```
CDELPATH DEVN(X'5000') +
PRIM(X'5E00' 13049 X'00') SEC(X'4E00' 25741 X'00')
```

Once the PPRC was done, all the devices were varied off-line and the chpids were configured off-line. The “PPRC” cables were not needed anymore so they were disconnected from the secondary ESS 800. The secondary ESS was connected to the primary MVS system, the chpids were configured on-line and the devices were varied on-line. An IODF update was needed after PPRC was complete because the primary and secondary ESS's had a different number of /bases/aliases.

## SAP Environment After PPRC



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## Conclusions

The elapsed time for copying 288 3390-9's (about 1 Terabyte of data total) was approximately 3.5 hours. We used PPRC V1 and ESCON to accomplish this task. With PPRC V2 and FICON, the speed of this process would have been much faster and copy time would have been shorter. The purpose of this paper is to show how this is done and to share this knowledge with others who may have similar needs. Our group, the Poughkeepsie Benchmark center, was very pleased with the performance and ease of use that PPRC provided. Our experience demonstrated that PPRC can be an easy and reliable solution to moving large amounts of data across control units. The procedure is well suited to move large SAP databases from one ESS to another.

## For Further Information

*DFMS Advanced Copy Services, SC35-0428*

DFSMS SDM Copy Services

<http://www.storage.ibm.com/software/sms/sdm.index.html>

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